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A PLUMOSE VARIETY OF THE EBONY SPLEENWORT.

GEORGE E. DAVENPORT.

(Plate 22.)

ASPLENIUM EBENEUM, Aiton, var. **Hortonae**, n. var. — Habit and rootstock as in the specific form. Fronds in two series as in normal forms; lower series smallest, rosette-like in arrangement, reclining in position, normally sterile, with closely set, more or less imbricated, alternate pinnae; larger series taller, erect, abnormally sterile, with more distinct, alternate, sessile, sub-sessile or short-stalked, obliquely incised or deeply pinnatifid obtuse pinnae, the oblique lobes cuneate and coarsely serrated, the basal lobes often distinct, the upper one the largest and somewhat auriculate; laminae ½ to 2 inches broad, pinnate nearly to the pinnatifid acute apex, lower portion abruptly diminished, the reduced pinnae lobed, or divided, and wholly different from the reduced simpler lobes of the normal forms. Stipe short, and, as well as the rhachis, vivid chestnut, or reddish brown, glossy, terete, or obscurely furrowed along the face in the living plant, shrivelling in drying and then appearing as if striated; clothed at the base with a few delicate linear-acuminate, ciliated, transparent scales with a central framework of brown, and containing two small vascular bundles that shortly coalesce into one; veins flabellately forked in the basal lobes, the whole system forming what Luerssen terms "Nervatio Sphenopteridis" in which some of the pinnae resemble sections of *Asplenium Adiantum-nigrum.*

This remarkable and most beautiful variety of the Ebony Spleenwort was found growing on limestone cliffs in company with typical *Asplenium ebeneum* and *A. Trichomanes* by Mrs. Frances B. Horton, at Brattleboro, Vermont, in September, 1900. It presents an appearance so striking that at first I was inclined to regard it as a new species.

Its lines of variation are, it is true, in the direction of a natural disposition on the part of even typical forms to become more or less serrated, but in the present instance this has been carried so far in the oblique incisions and lobings, and overlapping of the segments, that the normal form is completely lost sight of and in those fronds with closely imbricated pinnae the whole lamina has a beautifully frilled appearance that suggests some forms of *Asplenium lunulatum*, Swartz.

Coarsely serrated fronds of *A. ebeneum* are not infrequently found, especially in some of the highly developed southern forms with the pinnae conspicuously lobed, and a very remarkable form was collected in Maine several years ago by Miss Kate Furbish, but nothing like the present form, in which the change is so great as to render the plant almost unrecognizable, has ever been recorded.

Mrs. Horton is to be congratulated on so interesting a discovery, and it is to be hoped that she may be rewarded still further another season by finding fertile fronds. To judge from the plants already received this form must have been in existence several years, as the annual growth and decay are easily traced on the rootstock. I owe to the courtesy of Dr. Robinson the privilege of publishing this account as he placed in my hands the original specimen, received from Mrs. Horton, to whom I am also under obligations for an additional supply of necessary material. I am likewise indebted — and the readers of Rhodora no less so — to Miss Margaret Slosson for her kindness in preparing the plate which illustrates this account.[1]

Explanation of Plate 22. — *Asplenium ebeneum*, var. *Hortonae*; fig. 1, habital sketch; fig. 2, scale from base of stipe (magnified); fig. 3, lower pinna; fig. 4, one of the principal pinnae. Var. *serratum*, Gray in litt. and in herb. Davenport (Mass. Hort. Soc. 1872); fig. 5, a pinna from the original specimen collected by myself in 1872. *Asplenium ebeneum* (typical); fig. 6, a normal pinna.

Medford, Massachusetts.

[1] The name *Asplenium ebeneum* was first published by William Aiton in Hortus Kewensis, Vol. III. p. 462, London, 1789, with the following description "*fronde pinnata: pinnis lanceolatis subpaleatis serratis basi auriculatis, stipite laevissimo simplici.*" The date usually assigned for this publication is 1793, but the imprint on the title page of the copy in the Massachusetts Horticultural Society's Library is 1789.

THE GENUS SENECIO IN NEW ENGLAND.

J. M. Greenman.

Among the flowering plants there are few genera more widely distributed throughout North America than is the genus Senecio. In New England the indigenous species with but one exception (*S. Pseudo-Arnica*, Less.) all belong to the same natural group, and exhibit very close affinity.

The first species of this genus to be described from North America were *S. aureus* L., *S. Balsamitae*, and *S. obovatus*, Muhl. These were followed by the publication of other Atlantic species by Michaux, Pursh and other prominent botanists. Nearly all of these early described species, however, were later regarded either as identical with *S. aureus*, L., or as varieties or forms of the same. By more recent authors certain of these earlier species have been reinstated, and seemingly very justly so.

After a somewhat extended study of a representative collection of plants from different parts of North America, aided by a comparison with the originals in the older herbaria, the writer has been led to the adoption of a somewhat intermediate course in the disposition of the species of this particular group, as well as in the treatment of the North American species as a whole. It is hoped that the complete results may be brought forward at an early date; but it is thought that a synopsis of all the forms which are at present known to occur in New England may be of sufficient interest to merit publication.

The synopsis herewith presented is based entirely upon the macroscopic or more evident characters; and while now and then puzzling forms occur, yet in the main the specific limitations are tolerably constant. It should, however, be borne in mind that in any group of plants where the foliage is subject to such variation as in this particular group of Senecios, as complete specimens as possible should be obtained for satisfactory identification. The following are the species and varieties as now recognized for New England:

* Indigenous species: heads conspicuously radiate.

+- Heads large, 2 cm. or more high: stems leafy throughout.

1. Pseudo-Arnica, Less. Stems 1 to 6 dm. high, more or less

floccosely white-tomentose especially above: leaves oblong-lingulate, 5 to 20 cm. long, 1 to 6 cm. broad, sessile, half-clasping by a subauriculate base, or the lowermost narrowed below into a winged petiolar base, obtuse or rounded at the apex, entire or unequally dentate, usually green and glabrous above, densely white-tomentose beneath: heads large, including the rays 3 to 6 cm. in diameter: involucre calyculate with linear-attenuate or subsetaceous bracteoles: achenes glabrous.— Linnaea, vi. 240; Hook. Fl. Bor.-Am. i. 334, t. 113; Gray, Syn. Fl. i. part 2, 384; Britton & Brown, Ill. Fl. iii. 476, f. 4033; Watson & Coulter in Gray, Manual, ed. 6, 294.—Coast of New Brunswick, Grand Manan, *A. E. Verrill*, no. 3. Reported from the adjacent coast of MAINE.

+ + Heads medium-sized, about 1 cm. or less high: stems not leafy throughout.

++ Lower leaves all broad-ovate, cordate, rather large.

2. S. AUREUS, L. Stems erect from rather slender rootstocks, 3 to 6 dm. high, and at first as well as the foliage often more or less floccose-tomentose, later, except for a trace of tomentum in the axils of the leaves and in the inflorescence, essentially glabrous: lower leaves long-petioled, ovate-rotund to slightly ovate-oblong, 1.5 to 8 cm. long, two thirds as broad, crenate-dentate; cauline leaves lyrate to laciniate-pinnatifid, the uppermost sessile and amplexicaul: achenes glabrous. — Sp. ii. 870, & ed. 2, 1220; Gray, Syn. Fl. i. part 2, 391; Watson & Coulter, l. c. 293; Britton & Brown, Ill. Fl. iii, 480, f. 4047.—MAINE, valley of Limestone River, *Fernald* no. 2403; Blaine, *Fernald*, no. 2404; Easton, *Fernald* (coll. of 29 June, 1899); North and South Berwick, *Parlin & Fernald;* South Berwick, *Parlin;* Fayette and Presque Isle, *Miss Kate Furbish*: NEW HAMPSHIRE, Jaffrey, *Robinson*, no. 590; Greenville, *Fernald* (coll. of 6 June, 1897): VERMONT, Manchester, *Miss Mary A. Day*, no. 102: MASSACHUSETTS, vicinity of Boston, *Wm. Boott*, etc.: RHODE ISLAND, *Thurber*; near Providence, *Collins* (coll. of 24 May, 1891): CONNECTICUT, Southington, *Bissell* no. 343.

++ ++ Lower leaves chiefly long-lanceolate from a subcordate to an abruptly contracted base, only the earliest ovate-rotund, and these small.

3. S. ROBBINSII, Oakes. Stems strict, 5 to 7 dm. high, striate, glabrous above, slightly tomentose at the base: the first leaves small, ovate-rotund to ovate-oblong, 1 to 3 cm. long, from two thirds to nearly as broad, crenate-dentate; the later fully developed radical and lower-stem leaves long petiolate, lanceolate to slightly oblong-lanceolate, 3 to 10 cm. long, 1.5 to 3 cm. broad, acute, rather sharply and somewhat unequally dentate-serrate, glabrous upon either surface,

slightly tomentose along the margins of the sheathing petioles; the uppermost sublyrate to more or less laciniately pinnatifid, sessile and somewhat clasping: inflorescence cymose-corymbose: achenes glabrous. — Oakes ex Rusby in Bull. Torr. Club, xx. 19, t. 139; Britton & Brown, Ill. Fl. iii. 480, f. 4046. *S. aureus*, var. *Robbinsii*, Gray ex Rusby, l. c., *S. aureus*, var. *lanceolatus*, Oakes, Hovey's Mag. vii. 183; Torr. and Gray, Fl. ii, 442; Gray, Manual, 240; not *S. lanceolatus*, Torr. & Gray, l. c., 440. *S. aureus*, var. *Balsamitae*, Watson and Coulter, l. c. in part. — MAINE, region about Moosehead Lake, *Fernald*, no. 272; along St. John River, *Fernald* (coll. of 24 July, 1893); valley of Mattawamkeag River, *Fernald*, no. 2649; valley of Sandy River, *Fernald* (coll. of 9 July, 1896); Hartford, *Parlin* (coll. of July 1892); Orono, *Fernald* (coll. of 30 June, 1893); East Livermore, *Miss Kate Furbish* (coll. of June, 1888); Farmington, *C. H. Knowlton* (coll. of 21 June, 1893); NEW HAMPSHIRE, Jackson, *H. A. Purdie* (coll. of 10 September, 1896); White Mountains, Crawford Notch, *E. & C. E. Faxon* (coll. of 7 July, 1878), *Greenman*, no. 1105: VERMONT, Willoughby Lake, *Walter Deane* (coll. of 26 July, 1885); Middlebury, *Brainerd* (coll. of 23 and 25 June, 1883).

++ ++ ++ Lower leaves obovate to oblong-oblanceolate or subspatulate and gradually narrowed at the base (rarely rotund or oblong).

= Lower leaves obovate, or obovate-rotund.

4. S. OBOVATUS, Muhl. Stems erect, 3 to 6 dm. high, slightly tomentose at the base and in the axils of the leaves, soon glabrate: lower leaves obovate, 1 to 10 cm. long, two thirds as broad, usually cuneate at the base into a narrowly winged petiole, rarely rotund, glabrous upon either surface, margins crenate-dentate; stem-leaves sessile, pinnatifid or pinnatisect: inflorescence cymose-corymbose, not infrequently subumbellate: achenes glabrous.—Muhl. ex Willd. Sp. Pl. iii, 1999; DC. Prodr. vi. 432; Ell. Sketch, ii, 329; Britton & Brown, Ill. Fl. iii. 478, f. 4041. *S. aureus*, var. *obovatus*, Torr. & Gray, Fl. ii. 442; Gray, Syn. Fl. i. part 2, 391. — VERMONT, Pownal, *Eggleston*, no. 264: MASSACHUSETTS, Boxford, *Faxon* (coll. of 22 June, 1878): CONNECTICUT, Southington, *Bissell*, no. 344. This species reaches its greatest development and variation in the Southern States.

= = Lower leaves oblong-oblanceolate to subspatulate, gradually narrowed at the base.

a. Achenes usually glabrous; lower leaves comparatively short-petiolate.

5. S. BALSAMITAE, Muhl. Stems 1.5 to 3 dm. high, floccose-tomentose at the base, glabrous or nearly so above, often retaining loose tomentum in the leaf-axils: lower leaves commonly oblong-oblanceolate, 1 to 4 cm. long, 0.5 to 1.5 cm. broad, gradually narrowed below

into the petiole, crenate-dentate, frequently pubescent beneath when young, later glabrate, or glabrous from the beginning; stem-leaves more or less lyrate-pinnatifid, the uppermost sessile and much reduced: heads 1 cm. or less high: achenes usually glabrous.—Muhl. ex Willd. Sp. Pl. iii. 1998; DC. Prodr. vi. 432; Britton & Brown, Ill. Fl. iii. 479, f. 4043. *S. aureus*, var. *Balsamitae*, Torr. & Gray, Fl. ii. 442; Gray, Syn. Fl. i. part 2, 391, in part; Watson & Coulter in Gray, Man. ed. 6, 293, mainly. — Maine, mouth of Aroostook River, Ft. Fairfield, *Fernald*, no. 71; Orono, *Fernald* (coll. of 1 July, 1890); valley of Piscataquis River, Dover, *Fernald*, no. 118; valley of the St. John River, Fort Kent, *Fernald*, no. 2406: Vermont, Colchester, *Oakes*: Massachusetts, *Oakes*.

var. **pauperculus** (Michx.) Fernald in herb. Smaller, sometimes barely more than 3 cm. high: heads fewer, not infrequently reduced to one: plant with generally reduced habit and of northern range. — *S. paupurculus*, Michx. Fl. ii. 120. — Maine, Pamedumcook Lake, *J. W. Chickering* (coll. of 10 August, 1881); Lower Penobscot Valley, Old Town, *Fernald* (coll. of 18 September, 1897).

b. Achenes hirtellous-pubescent: lower leaves long-petiolate.

var. **praelongus**. Stems 2 to 5.5 dm. high, usually conspicuously floccose-woolly at the base: lower leaves long petiolate, oblong-oblanceolate, 1.5 to 6 cm. long, 10 to 12 mm. broad: stem-leaves rather large, even to 1 dm. in length, and 2 cm. in breadth, pinnatifid with rather remote lobes and rounded sinuses; achenes hirtellous-pubescent upon the angles. — Massachusetts, in rocky woods near the summit of Blue Hill, 9 June, 1895, *Wm. P. Rich*: Vermont, Manchester, *Miss Mary A. Day*, no. 210: New York, Watertown, *specimen ex herb. Wm. Boott.*

This variety has hitherto passed as *S. aureus*, var. *Balsamitae*, of authors, but it is a somewhat stouter plant with longer petiolate lower leaves, and with more pronounced stem-leaves than in typical specimens of the species proper. It is somewhat intermediate between the northern *S. Balsamitae*, Muhl, and the southern *S. Smallii*, Britton.

* * Introduced species: heads inconspicuously radiate, or rayless.

+ Pubescence viscid-glandular.

6. S. viscosus, L. A strong-scented annual, viscid-pubescent throughout, 2 to 4 dm. high, usually branched from the base: leaves half-clasping, 3 to 6 cm. long, two-thirds as broad, once or twice pinnatifid with rounded sinuses and angulate-sinuate lobes: head radiate; rays minute: achenes glabrous. — Sp. ii. 868, & ed. 2, 1217;

Engl. Bot. t. 32; Fl. Dan. t. 1230; Gray, Syn. Fl. i. part 2, 394; Britton & Brown, Ill. Fl. iii. 483, f. 4054 — MAINE, Mt. Desert Island, *Rand*, and adjacent coast: MASSACHUSETTS, vicinity of Boston, *Wm. Boott* (coll. of Sept., 1879); CAMBRIDGE, *B. L. Robinson* (coll. of 1 Sept., 1897): RHODE ISLAND, near Providence, *J. W. Congdon* (coll. of 4 Sept., 1874); *W. W. Bailey* (coll. of 1876).

+ + Pubescence not glandular.

++ Heads usually with short inconspicuous rays: involucre barely calyculate.

7. S. SYLVATICUS, L. Stems erect, 1 to 4 dm. high, simple or branched, usually somewhat pubescent: lower leaves petioled and more or less lyrate, the upper pinnatifid with unequal lobes, sessile, clasping and slightly sagittate, 2 to 15 cm. long, 1 to 8 cm. broad: inflorescence naked or nearly so: heads cylindrical; involucre barely calyculate with few and inconspicuous scales: ligules barely surpassing the disk-flowers (or none?): achenes canescent. — Sp. ii. 868, & ed. 2, 1217; Eng. Bot. t. 748; Fl. Dan. t. 869; Gray, Syn. Fl. i. part 2, 394; Britton & Brown, Ill. Fl. iii. 482, as to description. — MAINE, Mt. Desert Island and Southport, *Fernald.*

++ ++ Heads rayless: involucre conspicuously calyculate with short black-tipped scales.

8. S. VULGARIS, L. Stems 1 to 4 dm. high, essentially glabrous, or subfloccose-pubescent especially in the axils of the leaves and in the inflorescence: leaves pinnatifid, more or less lyrate, with angulately toothed divisions, sessile and subclasping, 2 to 8 cm. long: heads discoid: achenes puberulent along the angles. — Sp. ii. 867, & ed. 2, 1216; Fl. Dan. t. 513; Eng. Bot. t. 747; Gray, Syn. Fl. i. part 2, 394; Britton & Brown, Ill. Fl. iii. 482, f. 4053.— MAINE, Blaine, *Fernald* (coll. of 12 Sept., 1896): VERMONT, Rutland, *Eggleston:* MASSACHUSETTS, Ipswich, *Oakes;* Swampscott, *C. A. Weatherby* (coll. of 21 June, 1897); Revere Beach, *Greenman*, no. 515, RHODE ISLAND, Providence, *Thurber* (coll. of 1844): CONNECTICUT: Southington, *Andrews* no. 1.

BERLIN, GERMANY.

FOSSOMBRONIA SALINA IN CONNECTICUT.

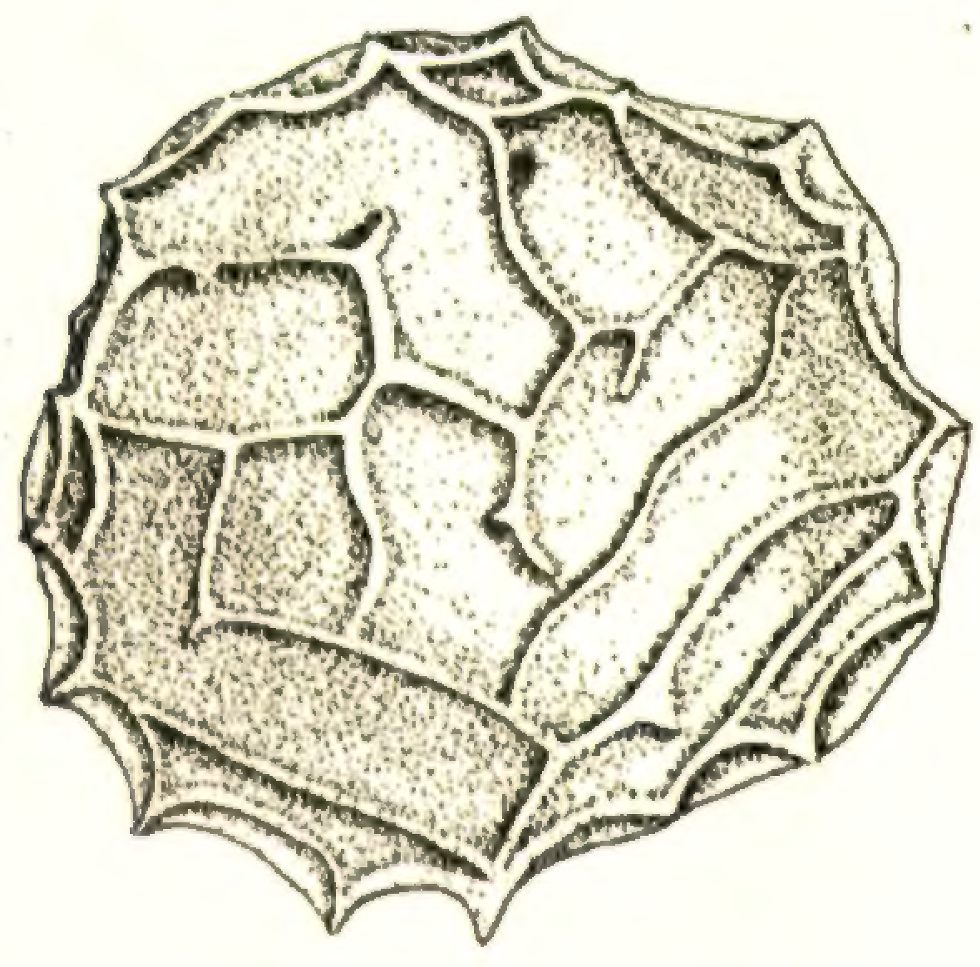
ALEXANDER W. EVANS.

THE various species of *Fossombronia* resemble one another so closely in their vegetative characters, that it is, in most cases, a questionable policy to describe new species from specimens whose capsules

and spores are not fully developed. The history of the present species, which has remained practically unknown for twenty-five years, will serve to emphasize this fact.

In 1872, Austin distributed, as *Fossombronia angulosa* Raddi,[1] a plant which he reported as common in brackish meadows, without giving any more definite indication of the locality where his specimens were found. It is probable, however, that the plants were collected in New Jersey, as they are listed in Britton's Catalogue of New Jersey Plants. In the two sets of Austin's exsiccatae which I have been able to examine, the specimens are quite destitute of mature capsules. Some of the stems, however, show sexual organs, among which are fertilized archegonia. As Austin noted that the plant matured in early spring, it is evident that these specimens were collected in late summer or early autumn before the sporophytes had had time to develop. In 1875, Lindberg,[2] in commenting on Austin's exsiccatae, asserts that these specimens do not agree with the true *Fossombronia angulosa* of Europe, but differ from it in being paroicous instead of dioicous. Although no other difference is mentioned, the specimens in Lindberg's set also being apparently without capsules, they are designated as *Fossombronia salina* n. sp. Since this time nothing new has been written about this imperfectly described plant, although attention is called to it by both Underwood[3] and Stephani,[4] who place it among the doubtful members of the genus.

A number of years ago, in August, the writer collected a large *Fossombronia* in a swamp in East Haven, Connecticut, perhaps half a mile from the salt water. The specimens were without capsules but showed well developed antheridia and archegonia on the same stem. Several years afterward upon visiting the locality late in May, numerous plants were found with somewhat immature capsules. These developed readily upon being brought into the laboratory and soon showed fully ripened spores. These specimens agree with Austin's in their large size, in their monoicous inflorescence and



Spore of Fossombronia salina × 730.

[1] Hep. Bor.-Amer. *no. 119*.

[2] Acta Soc. Sci. Fenn. 10: 533.

[3] Bot. Gazette, 21: 70. 1896.

[4] Mem. de l' Herb. Boissier, 16: 40. 1900.

in the season of the year in which they mature their spores. They agree also in the unsatisfactory characters drawn from the vegetative structure of the gametophyte, such as the outline of the stem-section, the shape of the leaves and the average size of the leaf-cells. Although these points of resemblance are not all that we might desire in the present genus, they seem sufficient to justify us in referring these East Haven specimens to Austin's *F. angulosa* and hence to Lindberg's *F. salina*.

Closely agreeing with the Connecticut plants and apparently referable to the same species, are the specimens from Florida, distributed by Underwood and Cook as *F. angulosa*.[1] These specimens, which were collected in March, are a little past maturity. They seem to have lost all signs of antheridia but show characteristic spores. Through the kindness of Professor Underwood, I have had the privilege of examining younger specimens of the same plant collected in January. On some of these, the capsules are just maturing, but there are also young branches present which exhibit both antheridia and archegonia, showing that the inflorescence is monoicous. It would appear as if the season for the ripening of the spores were a little less definite in Florida than farther north, but this might easily be accounted for by the differences in climate.

Although *Fossombronia salina* is known from so few localities, it will probably be found at intermediate stations along the Atlantic coast. The following description, drawn from spore-bearing material, will aid in its recognition:

FOSSOMBRONIA SALINA Lindb. Acta Soc. Sci. Fenn. **10**: 533. 1875.

F. angulosa Aust. Hep. Bor.-Amer. *no. 119*. 1872 (not Raddi).

Heteroicous: scattered or caespitose, dark green becoming paler or brownish with age: stems dichotomous, 1 cm. or more long, 0.3 mm. in diameter and about 10 cells thick, prostrate, closely adherent to the soil by means of numerous deep purple rhizoids, upper surface plane or slightly convex, lower surface strongly convex or carinate: leaves more or less imbricated except on attenuate axes, 1–1.3 mm. long, more variable in width, 1 cell thick except at the very base, quadrate-oblong from a broad, slightly decurrent base, apex broad, indistinctly lobed and crispate, the lobes very variable, mostly rounded but sometimes apiculate or acute: leaf-cells very variable in size, averaging 37 x 28 μ on edge of leaf, 60 x 30 μ in the middle and 70 μ at the base: pseudoperianth about 1.5 mm. high, turbinate, slightly and irregularly sinuate-lobed and

[1] Hep. Amer. no. 118.

crispate at the mouth, the lobes rounded, entire: capsule borne on a short stalk; spores 41–48 μ in diameter, brown, in some cases regularly reticulate with 11–13 polygonal meshes on convex face, usually irregularly furcate-lamellate without distinct meshes; lamellae low and thin, deeply pigmented in lower part and in the regions of anastomosis, often paler on the edges, projecting slightly on the margins of the spore as short, often indistinct points; elaters very irregular, with 2 or 3 spirals.

East Haven, Connecticut (Evans). New Jersey (Austin). Eustis, Florida (Underwood).

Fossombronia salina differs from *F. angulosa* in its inflorescence and in its leaf-cells, which are not markedly elongated at the base of the leaf. The spores of the European species also are a little smaller, they are very regularly reticulate with fewer meshes (mostly 7 to 10 on the convex face of the spore), the lamellae are higher and thinner, and their pale free margins are very distinct, appearing as a translucent wing on the margin of the spore.

Of the two other species of *Fossombronia* which have been found in New England, the common *F. foveolata* Lindb. (*F. Dumortieri* Lindb.) bears the most resemblance to *F. salina*. This species, however, is smaller and is an annual, developing its sexual organs in the summer and its capsules in the autumn of the same year. Its spores are very like those of *F. salina* and are of about the same size, but they tend to be more regularly reticulate, and the meshes of the reticulum are smaller and more numerous (usually numbering from 15 to 20 on the convex face of the spore). The much rarer *F. Wondraczekii* (Corda) Dumort. (*F. cristata* Lindb.), now known from both New Hampshire and Connecticut, is also an annual plant, similar in general appearance to *F. foveolata*. Its spores are a little smaller than those of *F. salina* and have very different markings; their lamellae, which are much finer and more numerous, tend to be parallel as seen from one side of the spore but anastomose somewhat in the middle of the convex face, often forming a few irregular meshes in this region.

Yale University.

THE IDENTITY OF THE LINNAEAN GNAPHALIUM PLANTAGINIFOLIUM.

B. L. Robinson.

Perhaps none of the recent segregations among American flowering plants has been more surprising in extent and interest than the division of *Antennaria plantaginea*, R. Br. (*A. plantaginifolia*, Hook.). Long regarded as a single variable species, this polymorphous plant, familiar in our spring flora, has, upon close scrutiny, fallen into many rather well-marked and tolerably distinct species. Thanks to the observations and publications of Prof. Greene and Messrs. Fernald, Rydberg, and E. Nelson, the characteristics and affinities of the newly recognized forms are already pretty well known, yet, as in all such cases, the actual identity of the original type must be settled before the subsequently described segregates can have a fixed or definite status. In this instance the central species and historic type of the group rests upon the Linnaean *Gnaphalium plantaginifolium*, published in the Species Plantarum in 1753, and since the subdivision, no one has, I believe, been in a position to do more than guess at the identity of the Linnaean type. This has been due in part to the brevity and general nature of the original description, but chiefly to the lack of authenticated specimens upon this side of the Atlantic where the chief knowledge of the segregates exists. The first supposition regarding the Linnaean type was that of Prof. Greene, who regarded it as probably the plant (with leaves glabrous above) which he later described as *A. arnoglossa*. Mr. Fernald, on the other hand, regarded it as the commonest of the large-leaved Antennarias, a species which has a white flocculent pubescence upon the upper, as well as a denser, firmer pubescence on the lower surface of the leaves. This plant has been described by Prof. Greene as *A. decipiens*.

Last September I had an opportunity, while in London, to examine the extant material of the original *Gnaphalium plantaginifolium*, and found it to be a mixture. To make clear the relation of its elements, it will be best to reproduce the treatment in the first edition of the Species Plantarum. It is as follows:

Gnaphalium caule simplissimo, foliis radicalibus ovatis maximis, sarmentis procumbentibus.

Gnaphalium stolonibus reptatricibus longissimis, foliis ovatis, caule capitato. *Gron. virg. 95.*

Gnaphalium, plantaginis folio, virginianum. *Pluk. Alm.* 171, t. 348. f. 9. *Habitat in* Virginia. ♃.

Habitus *omnino praecedentis;* sed Folia *radicalia pollice majora, ovalia. Vidi solam feminiam; an praecedentis sola varietas?*

From an examination of this description it will be seen that the species rests upon three plants, namely, 1) the plant of Clayton, described by Gronovius, whose words, "*Gnaphalium stolonibus reptatricibus*," etc., are quoted by Linnaeus; 2) the plant of Plukenet, mentioned in the Almagestum as "*Gnaphalium plantaginis folio*," etc., and crudely figured in the same work, t. 348, f. 9; 3) the plant which Linnaeus himself examined and which suggested the words in the first lines, "*Gnaphalium caule simplissimo, foliis radicalibus ovatis maximis, sarmentis procumbentibus*," also the closing expressions regarding the habit.

Clayton's plant, definitely cited by Gronovius [1] as no. 287 was readily found in the herbarium of the British Museum of Natural History and proved to be neither species associated by recent American writers with the Linnaean *Gnaphalium plantaginifolium.* With solitary large terminal head and elongated slender stolons, in length exceeding the flowering stem, it was clearly the southern *A. solitaria*, Rydberg. The Plukenet plant was sought in vain even with the efficient assistance of Messrs. Carruthers, Hierns, and E. G. Baker, to whose courteous aid I am much indebted. As the fullest, if not the only, set of Plukenet plants is preserved at the British Museum, it is probable that as this plant is lacking there it is not extant. There is no evidence, as I am informed by Mr. Carruthers, that Linnaeus saw this plant of Plukenet, and there is positive proof that he did not see the plant of Clayton, for that is staminate, while Linnaeus expressly says that he had seen only the pistillate form. To learn just what Linnaeus had seen I examined the representation of Gnaphalium in his own herbarium, preserved in the rooms of the Linnaean Society of London, and there found a sheet of *Gnaphalium plantaginifolium*, clearly labeled in Linnaeus' own hand, but unfortunately without any indication of the collector. It bears two specimens evidently alike and both pistillate. Moreover, through the partial loss of their large lower leaves they present no slight

[1] Flor. Virg. ed. 1, 95.

habital resemblance to *Gnaphalium dioicum*. There can, therefore, be no reasonable doubt that these were the specimens which furnished to Linnaeus the characteristics recorded in the uncompiled (i. e., first and last) portions of his description and which, therefore, must be regarded as the types of the species. These specimens are precisely *A. plantaginea* as interpreted by Mr. Fernald (the *A. decipiens* of Prof. Greene). Regarding the identity of the Plukenet plant, there is certainly nothing either in the description or figure to prove it different from the plant of Linnaeus. It was, from the figure, surely not the same as the plant of Clayton, which has much longer stolons and obovate leaves, rounded, not pointed, at the apex. However, in comparison with the plant which was actually examined by Linnaeus and which seems to have furnished him the information contained in the original (uncompiled) portions of his description, neither the plant of Clayton, which he did not see, nor the plant of Plukenet, which he probably did not see, can have any great weight in determining the identity of the species. The brief pre-Linnaean descriptions of these two plants are cited by Linnaeus after his own technical description and merely as supposed synonyms. The fact that at least one of these quoted expressions proves not to be synonymous, certainly cannot invalidate or alter the species as conceived and described by Linnaeus from the material at his command.

Gray Herbarium.

MONARDA FISTULOSA AND ITS ALLIES.

M. L. Fernald.

The plants which have long been referred to *Monarda fistulosa* have recently been treated in very dissimilar ways by different authors. Dr. Gray in the Synoptical Flora regarded them all as phases of one polymorphous species, *M. fistulosa*, L., recognizing besides *M. fistulosa* three varieties, var. *rubra* (*M. purpurea*, Pursh), var. *media* (*M. media*, Willd.), and var. *mollis*, Benth. (*M. mollis*, L.). In the Illustrated Flora, however, Dr. Britton recognizes three species, *M. fistulosa*, L. (including *M. mollis*, L.), *M. media*, Willd. (*M. fistulosa*, var. *rubra*, Gray), and *M. scabra*, Beck (including *M. fistulosa*, var. *mollis*, Benth., in part). In view of these divergent

treatments, especially of the Linnaean *M. mollis*, Dr. Robinson while in London the past summer, examined the material of *M. fistulosa* and *M. mollis* in the Linnaean herbarium. There he found two sheets pinned together. One of these was marked " 1 " by Linnaeus and had later been marked in another hand (presumably of Sir James Edward Smith) "*fistulosa*." It was the custom of Linnaeus to number the sheets in his herbarium to agree with the numbers of the species in his Species Plantarum, and his " 1 " may thus be taken to indicate *M. fistulosa*, the first of the genus mentioned in Species Plantarum. This plant which represents the species apparently intended by Linnaeus as *M. fistulosa* has a hirsute stem and oblong-lanceolate finely and regularly serrated leaves which are hirsute on the midnerve and soft-pubescent on the surface beneath. In these characters the plant agrees well with a specimen collected by Dr. J. K. Small in middle Holston Valley, Virginia, July 20, 1892, and compared by Dr. Robinson with the Linnaean specimen.

The second sheet is of a plant cultivated at Upsal, and marked by Linnaeus " *H. U. fistulosa*." In the same hand, however, is the word " mollissima." This plant has canescent appressed (not hirsute) pubescence and it agrees with a Maine specimen collected by Mr. J. C. Parlin and compared by Dr. Robinson with the Linnaean plant. Considering the phrase in the original characterization: " Simillima *M. fistulosae*, at caule duplo majore, minime piloso ut in illa," and the " mollissima " written by Linnaeus upon the sheet, we are justified in considering the second specimen the type of *M. mollis*.

The confusion surrounding the name *Monarda mollis* began with Willdenow whose plant, at least as distributed from the Paris Garden in 1814, has the spreading pubescence of the Linnaean *M. fistulosa*. Bentham, too, applied the name *mollis* to plants different from the Linnaean species. His *M. fistulosa*, var. *mollis* was based upon *M. mollis*, L. and *M. menthaefolia*, Graham, two plants of rather different habit; while a sheet of specimens in the Gray Herbarium, sent out by Bentham to illustrate the Genera and Species of Labiatae, contains branches of both *M. mollis* and *M. fistulosa* of Linnaeus. Thus it is not surprising that the name *Monarda mollis* should have been of doubtful significance in our flora. Dr. Gray in his study of the group for the Synoptical Flora, seems to have interpreted the original plants correctly, but the minutely canescent *M. mollis* of Linnaeus is so constant in the character of its pubescence that its recognition as

a species distinct from *M. fistulosa* is probably justified. *M. menthaefolia*, Graham, a simple-stemmed plant of the Rocky mountains, generally united by authors with *M. mollis*, is habitally so well marked as to deserve treatment as a variety, although it lacks any other constant character to separate it specifically from that plant.

Monarda fistulosa and *M. media*, on the other hand, do not present any constant character by which they can be clearly separated. *M. fistulosa* in its typical form has lilac or salmon-pink corollas, and the spreading pubescence is well developed on the branches, while *M. media* has deep purple or crimson flowers and the spreading pubescence is confined chiefly to the leaves and their petioles. Numerous intermediate forms occur, however, so that the two plants can be considered only extreme varieties of one species.

The plants of the *fistulosa* group may now be treated as follows:

* Pubescence, at least of the petioles and midnerves (beneath) of the leaves, hirsute or long-villous, spreading.

M. FISTULOSA, L. Branches usually hirsute or villous: corolla lilac or salmon-pink. — Sp. 22; Benth. Lab. 316; Gray, Syn. Fl. ii. 374; Britton & Brown, Ill. Fl. iii. 103, except as to syn. *M. mollis*, Willd. Enum. 32; Britton & Brown l. c. as to syn.; not L. — New Hampshire to Texas and the Rocky Mountains. Often cultivated, and only a roadside escape in New England.

Var. RUBRA, Gray. Branches usually not hirsute nor villous: corolla deep purple or crimson.—Gray, l. c. *M. media*, Willd. l. c.; Britton & Brown, l. c. *M. fistulosa*, var. *media*, Gray, l. c. — Maine to North Carolina, Tennessee and Ohio. Often cultivated and perhaps not indigenous in New England.

** Pubescence minute, appressed, the leaves canescent, especially beneath.

M. MOLLIS, L. Mostly tall and branching: throat of calyx very densely white-bearded: corolla lilac. — Amoen. Acad. iii. 399. *M. scabra*, Beck, Am. Jour. Sci. x. 260; Britton & Brown, l. c. *M. fistulosa*, var. *mollis*, Benth. l. c. 317, in part; Gray, l. c. (except as to syn. *M. menthaefolia*). *M. fistulosa*, Britton & Brown, l. c., as to syn. — Maine to the Saskatchewan, Oregon, and Texas.

Var. **menthaefolia**. Simple or rarely a little branching: calyx usually less bearded at the throat. — *M. menthaefolia*, Graham, Edinb. Phil. Journ. 1829, 347; Hook. Bot. Mag. lvii. t. 2958. *M. fistulosa*, var. *mollis*, Benth. l. c.; Gray, l. c.; in part. *M. stricta*, Wooton, Bull. Torr. Club, xxv. 263. — MANITOBA, Brandon, July 8, 1894 (*John Macoun*): MONTANA, Bitterwood Valley, July 27, 29, 1880 (*S. Watson*, no. 329): IDAHO, Kootenai, 1861 (*Lyall*); Lake Pend

d' Oreille, Aug. 1, 1892 (*Sandberg, MacDougal & Heller*, no. 817): NEVADA, Reno (received from *Thomas Meehan*): COLORADO, Piedra, July 12, 1899 (*C. F. Baker*, no 572): NEW MEXICO, without locality, 1847 (*Fendler*, no. 603); Santa Fé Cañon, alt. 2460 m., July 2, 1897 (*A. A. & E. G. Heller*, no. 3798); White Mountains, alt. 2160 m., Aug. 1, 1897 (*E. O. Wooton*, no. 267); Chama, Sept. 5, 1899 (*C. F. Baker*, no. 570): ARIZONA, Willow Spring, alt. 2200 m., July, 1874 (*J. T. Rothrock*, no. 242), July 5, 6, 1890 (*Edw. Palmer*, no. 626); Fort Apache, June 21–30, 1890 (*Edw. Palmer*, no. 579); vicinity of Flagstaff, alt. 2160 m., July 8, 1898 (*D. T. MacDougal*, no. 258). — The original specimen from Drummond was probably from Norway House on the Saskatchewan and is approached by Bourgeau's plant from that region which, however, has the throat of the calyx more densely bearded than in the Rocky Mountain plants or as shown in the original plate of the Drummond plant.

GRAY HERBARIUM.

THE CORRECT DISPOSITION OF SISYMBRIUM NIAGARENSE. — In his monograph of the genus Sisymbrium Eugène Fournier described in 1865 [1] a new species, *S. niagarense*, collected at Niagara and said to be nearly related to the common hedge-mustard, *S. officinale*. Indeed, Fournier ventured the suggestion that it might be the *S. officinale* of Pursh and of Elliott. Unable from the description to place the plant more accurately and equally unable to identify it with any particular form of Sisymbrium from central North America, Dr. Gray [2] early suggested that it probably was only a form of *S. officinale*. This view (properly guarded by a mark of interrogation) was repeated in the Synoptical Flora and by Dr. Watson in his Bibliographical Index, while in the Index Kewensis the identity of *Sisymbrium niagarense* and *S. officinale* is recorded without any qualification.

On visiting the Jardin des Plantes in Paris, last July, the writer was permitted, through the kindness of Prof. Bureau and the staff of the herbarium, to examine Fournier's type. This, however, proved to be *Brassica nigra*, Koch, the common black mustard. To make the identity doubly certain, the specimen was subsequently reexamined by the writer in company with M. Danguy of the Botanical

[1] Recherches anatomiques et taxonomiques sur la famille des Crucifères et sur le genre Sisymbrium en particulier; Paris, 4to., 1865.

[2] Am. Journ. Sci. ser. 2, xlii. 278.

Museum at Paris. Although the specimen lacks the lower leaves there can be no doubt whatever that it is *Brassica nigra* and that it bears the original label of Fournier. Furthermore the specimen corresponds so closely to the description of *S. niagarense* that there can be no reason to suspect a confusion of specimens and labels. The name *S. niagarense*, Fourn., may, therefore, be transferred from the synonymy of *S. officinale*, L., to that of *Brassica nigra*, Koch, and one more question mark, of some years' standing, may thus be eliminated from American systematic botany. — B. L. Robinson.

The Vegetation of Plymouth Three Hundred Years Ago. — In the Rev. Alexander Young's "Chronicles of the Pilgrim Fathers from 1602–1625" there is a short account of the natural productions of the Plymouth shore. The vegetation is thus described:

"The land for the crust of the earth is a spit's depth, excellent black mould, and fat in some places; and vines everywhere, cherry-trees, plum-trees, and many others which we know not. Many kinds of herbs we found here in the winter, as strawberry leaves innumerable, sorrel, yarrow, carval, brooklime, liverwort, water-cresses, great store of leek and onions, and an excellent kind of flax or hemp."

Only three of the plants mentioned seem to require comment. What plant is intended by "carval" I do not know. Possibly the word is a variant of "carvies," said to be a vernacular name for *Carum Carui*, L. If this be the case the observer must have mistaken some indigenous Umbellifer for the European species, as he might easily do. It seems less probable that he could have failed to recognize two such familiar herbs as sorrel and water-cress, or have intended by those names any other plants than *Rumex Acetosella*, L., and *Nasturtium officinale*, R. Br.

Yet botanists agree in considering both as introduced species in North America. This testimony throws the date of the introduction very far back. When and by what means had they migrated, that the Pilgrims should find them already in possession of the virgin soil?

It appears probable that some curious and useful information concerning the primeval vegetation of the Atlantic coast might be gleaned from the accounts of contemporary writers. But this research, perhaps, may already have been made.—S. B. Parish, San Bernardino, California.

Tumble-Weeds.—In many instances the fact whether an annual plant be a tumble-weed or not, depends upon the conditions of its growth and exposure to strong winds. This is well illustrated by the following example. In the thin grass near trees at the Michigan Agricultural College, *Trifolium procumbens* has grown for thirty years or more without showing any symptoms of acting as a tumble-weed. In a grass garden begun on stiff clay in 1888 a patch two yards square of this clover was planted and kept free from grass and weeds. The clover plants became larger than usual and in autumn, to my surprise, they broke loose from the soil and went nicely with the wind for some distance.

In central Michigan I have seen the following plants act as tumble-weeds, and they all now grow or may soon arrive in many parts of New England.

Amaranthus albus.
Panicum capillare.
Agrostis scabra.
Lepidium apetalum.
Salsola Tragus.
Trifolium procumbens.
Cycloloma platyphyllum.
Oenothera biennis.
Gypsophila elegans.

This fall in clearing off the tops of *Statice Limonium*, where a clump of it grew in the Botanic Garden, I observed that the old stems were decayed near the ground and made no resistance as the cluster of stiff tops were taken hold of. Here, I thought, is another tumble-weed, for all it lacks is a good breeze. This observation on Statice makes me wish to hear from botanists of New England regarding its habit on their coast. Can anyone enlarge the above list of plants? — W. J. Beal, Michigan Agricultural College.

Cycloloma on Cape Cod. — On August 22 last I collected in Orleans, Mass., a plant which was determined at the Gray Herbarium as *Cycloloma platyphyllum*, Moquin. It was growing in dry sand by the roadside, about half a mile from the railroad, and I did not notice more than the one plant. This seems to be a new and extralimital station for this plant, the ordinary range for which is from Manitoba westward and southward. — John Murdoch, Jr., Roxbury, Massachusets.

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Margaret Slosson, del.

ASPLENIUM EBENEUM, var. HORTONAE, n. var.

Rhodora

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NOTES ON CRATAEGUS IN THE CHAMPLAIN VALLEY.

C. S. SARGENT.

THE following notes are based on collections accompanied by copious field notes made during the past two seasons by Mr. Ezra Brainerd principally in the neighborhood of Middlebury, Vermont, and by Mr. W. W. Eggleston near Rutland and Bennington, Vermont. They are supplemented by small collections made by Mr. A. W. Edson and Professor L. R. Jones near Burlington during 1899 and 1900, and by a number of specimens collected near Charlotte by Mr. C. G. Pringle and Mr. F. H. Horsford at different times during the last twenty-five years. Examination of this material shows that the Champlain valley is one of the richest regions in the world in forms of Crataegus and that the comparatively small part of the state of Vermont, extending from Burlington on the north to Bennington on the south and from the shores of Lake Champlain to the foot of the Green Mountains, contains more forms of the genus than botanists recognized only a few years ago on the entire continent of North America. Rich as are the collections of Crataegus which have lately been made in southwestern Vermont they probably do not exhaust the field and a few additions to the following list of Vermont species will probably be necessary after another season of field work.

CRUS-GALLI.

CRATAEGUS CRUS-GALLI, L. Rare and local. VERMONT, Ferrisburg, *F. H. Horsford*, June, 1899; Orwell, *W. W. Eggleston*, September, 1899; Chimney Point, *E. Brainerd*, September, 1899; Thomson's Point, near Charlotte, *C. S. Sargent*, September, 1900: NEW YORK, Crown Point, *W. W. Eggleston*, September, 1899.

Punctatae.

C. punctata, Jacquin. The common species, often attaining a large size.

Molles.

C. Champlainensis. Leaves ovate, acute, rounded, truncate, somewhat cordate or cuneate at the base, usually slightly divided into two or three pairs of narrow acute lobes, coarsely and sharply serrate often to the base with gland-tipped teeth, at the flowering time roughened above by short pale hairs and villose-pubescent below, at maturity thick and firm, bluish green and glabrous on the upper surface, yellow-green, and slightly pubescent on the lower surface of the slender midribs and remote primary veins, from 2 to 2½ in. long, from 1 to 1½ in. wide; petioles deeply grooved on the upperside, slender, from ¾ to 1 in. in length, tomentose or often nearly glabrous, dull red below the middle. Flowers in compact few-flowered villose corymbs; bracts and bractlets lanceolate to oblanceolate, coarsely glandular-serrate, caducous; calyx densely tomentose, the lobes lanceolate, closely glandular-serrate, villose usually only below the middle, reflexed after anthesis; stamens 10; filaments slender; anthers light yellow; styles 5, surrounded by tufts of pale hairs. Fruit short-stalked in compact erect tomentose clusters, obovate to oblong, bright scarlet, marked with scattered pale lenticels, more or less tomentose at the ends, from ½ to ⅝ in. in length, ½ in. in width; calyx prominent, long-tubed, persistent, the lobes erect or spreading, tomentose, glandular-serrate; flesh thick, yellow, dry and mealy; nutlets 5, $\frac{5}{16}$ in. long, broadly ridged on the back.

A tree from fifteen to twenty feet in height with a well-developed trunk eight or ten inches in diameter covered with red-brown scaly bark, stout wide-spreading branches often forming a symmetrical round-topped head, and slightly zigzag branchlets marked with large oblong white lenticles, tomentose at first, becoming light chestnut-brown during the first summer and ashy gray during their second year, and armed with slender straight or slightly curved bright chestnut-brown spines from 1½ to 2 in. long. Flowers during the first week in June. Fruit ripens toward the end of September but remains on the branches until the New Year.

Vermont, Middlebury, *E. Brainerd*, June and September, 1900: New York, Crown Point, *Brainerd & Sargent*, September, 1900: Province of Quebec, Chateaugay, Adirondack Junction, Caughnawaga, *J. G. Jack*, 1899, 1900.

C. Champlainensis has been probably often confounded with *C. mollis* of Scheele of the central west, from which it is distinguished

by its smaller flowers with 10 not 20 stamens, smaller and less tomentose leaves, and by its smaller oblong or pear-shaped fruits, which usually do not fall until winter.

C. Pringlei. Leaves oval, pointed, rounded and often abruptly contracted at the base into the slender petioles, or on vigorous shoots truncate or slightly cordate at the base, sometimes irregularly lobed with short broad acute lobes, coarsely and often doubly serrate with gland-tipped teeth, at the flowering time roughened above with short closely appressed pale hairs, glabrous below with the exception of a few pale hairs along the slender midribs and remote primary veins, at maturity thin, glabrous and bright yellow-green on the upper surface, paler on the lower surface, from 2 to 2½ in. long and from 1¾ to 2¼ in. wide, or on vigorous shoots often 3 in. long and wide; petioles from 1 to 1¾ in. long, deeply grooved, at first villose or tomentose, more or less glandular with scattered dark glands, finally often nearly glabrous. Flowers from ¾ to 1 in. diameter, in many-flowered tomentose corymbs; calyx broad, tomentose, the lobes lanceolate, coarsely glandular-serrate, hirsute on the upper surface; stamens 10; filaments slender; anthers small, yellow; styles 3 to 5, surrounded at the base by conspicuous tufts of pale tomentum. Fruit oblong, dark dull red, villose at the ends with long scattered pale hairs, marked by a few large pale lenticels, ¾ in. long, about ⅝ in. thick; calyx cavity deep and narrow, the lobes nearly triangular, tomentose, pale, erect, often deciduous; flesh yellow, thick, dry and mealy, acid, with a disagreeable flavor; nutlets 5, pale, ⅓ in. long, rounded and slightly ridged on the back.

A tree from 20 to 25 feet in height with a well-formed trunk covered with dark red-brown scaly bark, stout branches forming a wide symmetrical head, or often of shrubby habit with numerous erect stems, and slightly zigzag branchlets marked with oblong pale lenticels, at first dark green and tomentose, becoming chestnut-brown and very lustrous during their first season, bright orange-brown during their second year and ashy gray during their third season, and armed with stout straight or slightly curved chestnut-brown spines often 1½ in. long. Flowers open during the last week of May. Fruit ripens at the end of September or early in October and soon falls.

Common in the Champlain Valley at least as far north as Charlotte, Vermont, where it appears to have been first collected in May, 1877, by *C. G. Pringle*; Crown Point, New York, October, 1899, and Bald Mountain, Shrewsbury, Vermont, *W. W. Eggleston*, May, 1900; Middlebury, Vermont, and Crown Point, New York, *E. Brainerd*, September, 1900; Guild, New Hampshire, *B. L. Robinson*, September, 1899, (No. 672); Rochester, New York, *C. S. Sargent*, September, 1900; near Toronto, Canada, *D. W. Beadle*, September, 1899; Lansing, Michigan, *C. F. Wheeler*, September, 1898; near Barrington, Illinois, *E. J. Hill*, September, 1899.

This species, which has been confounded with *C. tomentosa*, Lin-

naeus, and with *C. mollis*, Scheele, can always be readily distinguished by its thin drooping oval leaves which, except on vigorous shoots, are frequently convex by the gradual infolding of the blades from the midribs to the margins.

Flabellatae.

C. lobulata. Leaves oval to oblong-ovate, acute, cuneate or rounded at the entire base, deeply divided above into numerous narrow acute lobes, sharply and often doubly serrate with spreading glandular teeth, coated above until after the opening of the flowers with short soft pale hairs and slightly puberulous below on the slender midribs and thin arching primary veins, at maturity membranaceous, dark yellow-green and glabrous on the upper surface, paler and slightly villose below toward the base of the midribs with occasional short pale hairs, from 2½ to 3½ in. long and from 2 to 2½ in. wide; petioles slender, nearly terete, sometimes glandular on vigorous shoots, coated at first with short matted tomentum, ultimately slightly villose or nearly glabrous, bright red, from 1 to 1½ in. long. Flowers ¾ in. in diameter, in rather compact thin-branched tomentose compound cymes; bracts and bractlets linear-lanceolate, glandular-serrate, bright red; calyx narrow, dark red, glabrous or villose toward the base, the lobes linear, acuminate, glandular-serrate with stipitate red glands, glabrous; stamens 10; filaments slender; anthers small; styles 3 to 5. Fruit in compact erect slightly tomentose clusters, oblong, somewhat flattened at the full and rounded ends, bright crimson, lustrous, marked by occasional small white lenticels, about ¾ in. long and ⅝ in. thick; calyx cavity deep and narrow, the lobes small, lanceolate, coarsely glandular-serrate, tomentose on the upper surface, erect and incurved, persistent; flesh thick, yellow, sweet and juicy; nutlets 3 to 5, thin, dark-colored, ridged and often grooved on the back, ¼ in. long.

A tree occasionally 35 feet in height with a tall trunk often a foot in diameter covered with dark red-brown scaly bark, stout usually ascending branches forming an open irregular head, and slender branchlets at first dark green and tomentose, becoming bright chestnut-brown and lustrous during their first season and light orange-brown during their second year, and sparingly armed with short stout chestnut-brown spines rarely more than an inch in length. Flowers during the last week of May. Fruit ripens and falls early in October.

Vermont, Middlebury, *E. Brainerd*, May and September, 1900; Charlotte, *F. H. Horsford*, August, 1900; near Burlington, *L. R. Jones*, October, 1899: New York, Crown Point, *E. Brainerd*, September, 1899, *E. Brainerd & C. S. Sargent*, September, 1900.

Well distinguished from the related *C. Holmesiana* by its more deeply divided and greener leaves, by its tomentose cymes, larger flowers, more numerous stamens, and by its late-ripening fruit.

C. Holmesiana, Ashe, Jour. Elisha Mitchell Sci. Soc. xvi. pt. ii. 78 (1890). Sargent, Bot. Gazette, xxxi. 10. Vermont, Charlotte, *F. H. Horsford*, May and September, 1899; North Pownal and Fairhaven, *W. W. Eggleston*, September, 1899; Bennington and West Rutland, *W. W. Eggleston*, May, 1900; Ferrisburg, *E. Brainerd*, September, 1899; Weybridge, *E. Brainerd*, May and September, 1900.

Tenuifoliae.

C. acutiloba. Leaves ovate, acute, rounded or wedge-shaped at the base, laciniately cut into four or five pairs of acute or acuminate narrow lobes, their tips entire, spreading, and often more or less curved downward, sharply glandular-serrate with incurved teeth, bronze red as they unfold and coated on the upper surface with soft pale appressed hairs, at maturity membranaceous, glabrous, dark yellow-green above, paler below, 2 to 3 in. long and ½ to 2 in. wide, with slender midribs and veins running to the tips of the lobes; petioles slender, nearly terete, glandular with minute dark glands, often dark red, from 1 to 1½ in. in length. Flowers ¾ in. in diameter in broad loose many-flowered thin-branched glabrous cymes; bracts and bractlets linear-lanceolate to oblanceolate, coarsely glandular-serrate, light red; calyx narrowly obconic, glabrous, the lobes linear-lanceolate, long-pointed, entire, tipped with bright red glands, reflexed after anthesis; stamens usually 10; filaments slender, elongated; anthers small, rose-color; styles 3 or 4, surrounded at the base by a thin ring of pale tomentum. Fruit in loose large pendulous clusters, oblong or obovate, bright scarlet, very lustrous, about ½ in. long and ⅓ in. thick; calyx cavity deep and narrow, the lobes elongated, reflexed and closely appressed, usually persistent; flesh thin, dry and mealy; nutlets usually 2 or 3, prominently ridged on the back, ¼ in. long.

A broad shrub often 10 or 12 feet high with many stout intricately branched stems and slender chestnut or orange-brown lustrous branchlets marked with pale lenticels, becoming ashy gray during their second season, sometimes nearly unarmed but usually furnished with stout straight or slightly curved spines from 1 to 2 in. in length. Flowers at the end of May. Fruit ripens after the middle of September and remains on the branches for several weeks, falling gradually.

The common thin-leaved species of the Atlantic coast from Massachusetts Bay to Nova Scotia and not rare in northern New Hampshire, in the Champlain Valley and in the neighborhood of Montreal. Well distinguished from the other thin-leaved species, with 10 stamens and rose-colored or pink anthers, by the sharp usually deep lobing of the leaves. This plant is cultivated in England as *Crataegus coccinea indentata*, Loudon, but Loudon's figure of his variety of

that name (Arb. Brit. ii. 817, f. 566), which cannot be satisfactorily determined, certainly represents another plant.

C. matura. Leaves oval or rhomboidal to ovate-oblong, acute or acuminate, cuneate or on vigorous shoots often rounded at the broad base, incisely divided into numerous short acute spreading lobes, finely doubly serrate often nearly to the very base with glandular incurved teeth, covered on the upper surface while young with short soft fine hairs and at maturity membranaceous, glabrous, dark rich green above, paler and yellow-green below, from 2 to 3 in. long and from 1½ to 2 in. wide, with thin midribs slightly impressed above and slender primary veins arching to the points of the lobes; petioles slender, nearly terete, often slightly winged above on vigorous shoots, glandular, from 1 to 1½ in. in length. Flowers in broad many-flowered slender branched cymes; calyx cup-shaped, glabrous, the lobes lanceolate, acute, slightly and irregularly glandular-serrate or entire, villose on the upper surface, reflexed after anthesis; stamens 20; filaments slender, elongated; anthers minute; styles 5. Fruit in erect or drooping clusters; oblong, full and rounded at the ends, ¾ in. long, ½ in. thick, lustrous, dark purplish crimson when fully ripe; calyx cavity deep and narrow, the lobes small, slightly glandular-serrate or entire, villose above, prominently ribbed below, usually erect, persistent; flesh thick, yellow, soft and pulpy; nutlets 5, thin, dark-colored, rounded and ridged on the back with high thick ridges, ¼ in. long.

A shrub from 6 to 10 feet high with slender stems and glabrous lustrous orange brown branchlets becoming ashy gray during their second season, and armed with few usually straight spines from 1 to 2 in. in length.

Rocky hillsides, common. Flowers at the end of May. Fruit begins to ripen by the middle of August and usually has entirely disappeared before the 10th of September.

Vermont, Hotel pasture, Burlington, *A. W. Edson*, May, 1900; Weybridge, Bristol and Middlebury, *E. Brainerd*, August and September, 1900; Middlebury, *C. S. Sargent*, September, 1900; Massachusetts, West Boylston, *J. G. Jack*, September, 1899, and *C. S. Sargent*, September, 1900.

Well distinguished from the other species of this group by its 20 stamens and by the early ripening of the fruit, which probably matures earlier than that of any other New England species.

C. pastorum. Glabrous with the exception of a few scattered pale hairs on the upper surface of the unfolding leaves. Leaves ovate, acute, full and rounded or occasionally cuneate or on vigorous shoots cordate at the broad base, slightly divided above the middle into short broad acute lobes, doubly serrate with usually straight teeth tipped with dark red glands, bronze red as they unfold, at maturity thick and firm in texture, dark dull blue-green on the upper surface, pale and often glaucous on the lower surface, 1½ to

2 in. long and 1¼ to 2 in. wide, with midribs deeply impressed above and few slender primary veins; petioles very slender, nearly terete, 1 to 1¼ in. in length, sometimes glandular on leading shoots. Flowers ¾ in. in diameter on short stout pedicels, in compact many-flowered corymbs; bracts and bractlets lanceolate, conspicuously glandular-serrate, bright red, caducous; calyx broadly obconic, the lobes lanceolate from broad bases, entire or obscurely glandular-serrate, tipped with conspicuous bright red glands, reflexed after anthesis; stamens usually 10, sometimes 5 to 10, rarely 20; filaments slender, elongated; anthers small, rose-purple; styles 2 to 5, usually 2 or 3. Fruit in loose drooping clusters, oblong, bright scarlet, lustrous, marked with large pale scattered lenticels, about ½ in. long and ⅓ in. thick; calyx-cavity broad and shallow, the lobes elongated, spreading or appressed, sometimes erect and incurved, often deciduous; flesh thick, bright yellow, dry and mealy; nutlets usually 2 or 3, occasionally 4, broadly ridged on the back, about ¼ in. long.

A broad bush often 15 feet in height with numerous thick stems standing erect and remote from one another at the top and thus forming an open broad head, and stout branchlets marked with oblong pale lenticels, bright chestnut-brown and lustrous during their first season, ashy gray during their second year, and armed with numerous spines, on some plants short and stout, on others elongated, more slender and straight or incurved. Flowers at the end of May. Fruit ripens from the 20th of September to the 10th of October and usually hangs on the branches until long after the leaves have fallen.

Rich hillsides and pastures, common from the Champlain Valley and Berkshire County, Massachusetts, to central and southern Massachusetts.

Easily distinguished from the other New England species of this group by the erect remote ends of the stems, by the thicker blue-green leaves pale on the lower surface, which hang down conspicuously on their slender petioles when the flowers are open.

C. pentandra. Leaves oval to ovate, acuminate, broadly cuneate or rarely rounded at the base, incisely divided above the middle into numerous short acute lobes, coarsely and often doubly glandular-serrate with spreading or incurved teeth, membranaceous, dark green and roughened above with short rigid pale hairs, pale and glabrous below, 2 to 2½ in. long, from 1½ to 2 in. wide, with slender midribs and thin primary veins running to the points of the lobes, or on vigorous shoots often from 3½ to 4 in. long and 3 in. wide; petioles slender, often slightly winged above, grooved, glandular with minute scattered dark glands, about 1 in. long. Flowers ⅗ in. in diameter in few-flowered compact glabrous thin-branched cymes; bracts and bractlets narrowly obovate to linear-lanceolate, obscurely glandular-serrate, light red; calyx obconic, glabrous, dark red, the lobes linear-lanceolate, entire and finely glandular-serrate, incurved after anthesis;

stamens 5, slender, incurved; anthers comparatively large; styles 3, surrounded by a thin tuft of hoary tomentum. Fruit oblong, full and rounded at the ends, dark crimson, lustrous, marked with minute pale lenticels, usually about $\frac{5}{8}$ in. long and $\frac{1}{2}$ in. thick, the calyx prominent and enlarged with elongated strongly incurved lobes persistent or sometimes deciduous; flesh yellow, thick, dry and mealy; nutlets 3, ridged on the back with a broad ridge $\frac{1}{8}$ in. long.

A tree 12 to 15 feet in height with a trunk 5 or 6 in. in diameter stout branches forming a broad erect head irregular in outline, and slender glabrous branchlets marked with large pale lenticels, during their first season bright chestnut-brown, or in the case of vigorous shoots light orange-green, ashy gray in their second year, and armed with slender straight or incurved spines from 1 to $1\frac{1}{2}$ in. long. Flowers about May 20. Fruit ripens the middle of September.

Vermont, Bennington, and West Rutland, *W. W. Eggleston*, May and September, 1899; Middlebury, Ferrisburg and West Rutland, *E. Brainerd*, August and September, 1900.

Dilatatae.

C. dilatata, Sargent, Bot. Gazette, xxxi. 9 (1901). Vermont, Ferrisburg and Middlebury, *E. Brainerd*, May and August, 1900.

Pruinosae.

C. pruinosa, Wendland. Vermont, West Rutland, *W. W. Eggleston*, September, 1899, May, 1900; New Haven, *E. Brainerd*, June and October, 1900; near Burlington, *A. W. Edson*, June, 1900; New York, Crown Point, *Brainerd & Sargent*, September, 1900.

Tomentosae.

C. macracantha, Lindley. Vermont, near Burlington, *L. R. Jones*, October, 1899; Middlebury, *E. Brainerd*, September, 1900; New York, Crown Point, *Brainerd & Sargent*, September, 1900.

C. succulenta, Link. Common. Vermont, Charlotte, *C. G. Pringle & F. H. Horsford*, June and September, 1879; Middlebury, Ferrisburg, New Haven, Waybridge, W. Rutland, *E. Brainerd*, 1900.

Coccineae.

C. coccinea var. rotundifolia, Sargent, Bot. Gazette, xxxi. 14 (1901). Vermont, shores of Connecticut River, Lemington, *W. W. Eggleston*, August, 1899; Orwell, *W. W. Eggleston*, September.

1899; Fairhaven, *W. W. Eggleston*, May and June, 1900; Vergennes, *E. Brainerd*, August, 1900; Chimney Point, *E. Brainerd*, September, 1900; near Burlington, *A. W. Edson*, June, 1900: New York, Crown Point, *Brainerd & Sargent*, September, 1900.

C. praecox. Leaves rhomboidal, or on leading shoots nearly oval or ovate, acute, cuneate and decurrent at the base on the stout glandular petioles, divided above the middle into numerous short acute lobes, doubly serrate with broad glandular teeth except at the base, at the flowering time thin, yellow-green, coated above with short pale hairs, villose below on the slender midribs and thin primary veins arching to the points of the lobes; at maturity coriaceous, dark green, lustrous and scabrous above, paler and yellow-green below, from 1½ to 2 in. long and wide. Flowers in many-flowered broad loose villose cymes; bracts and bractlets linear-lanceolate to narrowly obovate, coarsely glandular-serrate, caducous; calyx narrowly obconic, densely coated with long white matted hairs, the lobes narrow, elongated, acute, glandular-serrate, nearly glabrous; stamens 10; filaments slender, elongated; anthers small, pale yellow; styles 3 to 5. Fruit subglobose, in pendulous villose clusters, dark crimson, somewhat hairy with scattered pale hairs especially at the ends, ⅔ in. in diameter; calyx cavity broad and shallow, the lobes acute, spreading, glandular-serrate, red on the upper side near the base, early deciduous; flesh yellow, thick, soft and pulpy; nutlets 5, ridged on the back with broad high rounded ridges, ¼ in. long.

A shrub 8 or 10 feet in height with numerous slender stems and zigzag lustrous orange-brown branchlets armed with numerous slender chestnut-brown spines 1½ to 2 in. long. Flowers at the end of May. Fruit ripens toward the end of August and falls early in September.

Vermont, Marsh Hill, Ferrisburg, *E. Brainerd*, August, 1900: New York, Crown Point, *Brainerd & Sargent*, September 9, 1900: Quebec, Caughnawaga, *J. G. Jack*, August, 1899, May and September, 1900.

This appears to be the *Crataegus glandulosa typica* of Regel, judging by plants in the Arnold Arboretum raised from seeds received under that name from the St. Petersburg Botanic Garden. Regel's varietal name *typica*, however, had been previously used by him in another species and thus cannot be taken up for this plant. *C. praecox* belongs to the Coccinea group and differs chiefly from the *C. coccinea* of Linnaeus, as I understand it, in its early-ripening fruit, the fruit of *C. coccinea* and of its variety *rotundifolia* being almost the latest of the Thorn Apples of New England to ripen and fall.

C. Brainerdi. Leaves ovate, acute or acuminate, cuneate or rounded and decurrent at the base on the slender grooved obscurely glandular petioles, slightly divided above the middle into numerous

short acute or acuminate lobes, coarsely and usually doubly serrate with glandular straight or incurved teeth, roughened above in early spring with short closely appressed pale hairs, at maturity thick and firm in texture, glabrous, dark green and lustrous on the upper surface, pale on the lower surface, $2\frac{1}{4}$ to 3 in. long, $1\frac{1}{2}$ to 2 in. wide, with slender midribs slightly impressed above and thin primary veins running to the points of the lobes. Flowers $\frac{3}{4}$ in. in diameter in broad glabrous thin-branched compound many-flowered cymes; calyx narrowly obconic, the lobes linear-lanceolate, acuminate, slightly glandular-serrate, strongly reflexed after anthesis; stamens 20; filaments slender, elongated, usually persistent on the fruit; anthers small; styles 3, surrounded at the base by a narrow ring of hoary tomentum. Fruit erect on short stout peduncles, oblong, full and rounded at the ends, bright scarlet, $\frac{1}{2}$ in. long, and $\frac{1}{4}$ to $\frac{1}{3}$ in. thick; calyx cavity broad and deep, the lobes elongated, villous on the upper surface, irregularly glandular-serrate mostly above the middle, spreading or reflexed; flesh thick, light yellow, sweet and dry; nutlets 3, dark colored, conspicuously ridged on the back with a prominent thick rounded ridge, about $\frac{1}{3}$ in. long.

A broad shrub occasionally 8 or 10 feet in height with slender glabrous branchlets bright chestnut-brown and lustrous during their first season, becoming ashy gray during their second year, and armed with stout usually curved spines rarely more than an inch and a half long. Flowers at the end of May. Fruit ripens late in September and early in October.

Roadsides near Middlebury, Vermont, rare and local, *E. Brainerd*, May and September, 1900.

In the form and texture of the leaves and in their winged glandular petioles, and in the character of the fruit, *C. Brainerdi* shows its relationship with *C. coccinea* of Linnaeus, but from all the other members of the Coccinea group which I have seen it differs in having 20 not 10 stamens.

Intricatae.

C. intricata, Lange. Vermont, only on rocky benches of Twin Mountain, West Rutland, *W. W. Eggleston*, June and October, 1900.

C. modesta Leaves ovate, acute, cuneate, rounded or on leading shoots truncate or slightly cordate and abruptly narrowed at the base, divided into numerous short broad acute lobes, occasionally appearing 3-lobed by the greater development of the lowest pair, sharply doubly serrate with minute glandular spreading teeth, in early spring bronze color, hirsute above with short white hairs and villose below, at maturity thick and firm in texture, dark yellow-green and scabrous on the upper surface, pale and pubescent below along the slender often light-red midribs and 2 or 3 pairs of prominent veins, or sca

brous over the lower surface of the leaves of vigorous shoots, from 1½ to 2 in. long and from 1 to 1¼ in. wide; petioles more or less winged above, villose, glandular, often red, from ½ to ⅝ in. long. Flowers nearly 1 in. in diameter on short stout pedicels in compact 3- to 6-flowered villose corymbs; bracts and bractlets lanceolate, conspicuously glandular-serrate with stipitate large dark glands; calyx broadly obconic, villose, the lobes lanceolate, glandular-serrate, coated with matted pale hairs; stamens 10; filaments short and stout; anthers large, pale yellow; styles 3, surrounded at the base by tufts of matted white hairs. Fruit erect on short villose peduncles, subglobose and flattened at the ends, or rarely oblong or pear-shaped, about ½ in. long, green, bright yellow or orange with a red cheek, marked with numerous large dark spots; calyx high and prominent with a broad deep cavity, the lobes small, linear-lanceolate, glandular-serrate, spreading, mostly deciduous; flesh thick, light yellow, sweet, dry and mealy, nutlets 3, broad, conspicuously ridged on the back with broad thick ridges, ¼ in. long.

A shrub with numerous much-branched slender stems 1 to 3 feet in height, bright chestnut-brown and lustrous during their first season, later becoming dull gray-brown, and armed with thin straight spines ¾ to 1½ in. long. Flowers during the first week of June. Fruit ripens toward the end of September.

Found only on dry rocky benches of Twin Mountain, West Rutland, Vermont, growing with *C. intricata*, Lange, *W. W. Eggleston*, May 31, 1899, *Brainerd & Eggleston*, September, 1899, *Eggleston & Sargent*, June 2, 1900.

Anomalae.

C. scabrida. Leaves oval to obovate, acuminate, gradually narrowed from near the middle to the cuneate base, divided above into numerous short spreading lobes, irregularly glandular-dentate nearly to the base, with slender midribs deeply impressed above and thin veins running to the points of the lobes, coated above at the flowering time with short soft pale hairs, at maturity thick and firm, dark green and scabrate on the upper surface, pale yellow-green and glabrous on the lower surface, 2 to 3 in. long and from 1½ to 2 in. wide; petioles slender, occasionally glandular, often slightly winged above, ½ to 1¼ in. long. Flowers ¾ in. in diameter, in loose broad thin-branched glabrous cymes; calyx narrowly obconnate, glabrous, the lobes linear-lanceolate, long-pointed, finely glandular-serrate, reflexed and bright red at the tips after anthesis; stamens 5 to 15; filaments slender, elongated; anthers small, pale yellow; styles 3, surrounded by a thick tuft of pale tomentum. Fruit in loose drooping clusters, subglobose, scarlet ½ in. in diameter; calyx cavity broad and shallow, usually only the bases of the elongated reflexed lobes

persistent at maturity; flesh yellow, thick, dry and mealy; nutlets 3, thick, rounded and prominently ridged on the back ⅓ in. long.

An intricately branched tree 15 to 20 feet in height with a trunk 6 or 8 in. in diameter, spreading horizontal branches forming a broad round-topped head, or often shrubby, and stout, slightly zigzag glabrous branchlets marked with oblong pale lenticels, dark chestnut-brown during their first season, becoming ashy gray during their second year, and armed with slender straight or curved spines from 1½ to 2 in. in length. Flowers at the end of May. Fruit ripens from the middle to the end of September.

Vermont, Bennington and West Rutland, *W. W. Eggleston*, September 8, 1899, and May and September, 1900; Middlebury and New Haven, *E. Brainerd*, 1900: New Hampshire, Troy, *E. L. Rand & B. L. Robinson* (no. 674), September 23, 1899.

C. Egglestoni. Leaves oval or on leading shoots often nearly orbicular, acute, rounded or cuneate at the broad base, slightly divided above the middle into numerous short acute lobes, coarsely doubly serrate with glandular teeth, dark yellow-green and roughened above with short persistent pale hairs, pale and glabrous below, about 2 in. long and 1½ to 2 in. wide, with slender midribs and primary veins only slightly impressed above; petioles slender, deeply grooved, glandular with small scattered dark glands, more or less winged at the apex, reddish brown toward the base, ¾ in. long. Flowers ⅝ in. in diameter, in crowded compound many-flowered cymes, the slender branches and petioles covered with scattered long white soft deciduous hairs; calyx-tube obconic, glabrous, the lobes narrow, acute, glandular-serrate with minute dark red glands, villose on the upper surface, reflexed after anthesis; stamens usually 5, occasionally 7 or 8; filaments slender, elongated; anthers small, pale rose-color; styles 2 or 3. Fruit pendant in many-fruited clusters, oblong, full and rounded at the ends, orange-color at first when fully grown, at maturity bright crimson, lustrous, marked with occasional large pale dots, ½ in. long; calyx cavity deep and narrow, the lobes entire or slightly dentate above the middle, appressed; flesh thick, yellow, sweet, dry and mealy; nutlets 2 or 3, more or less prominently ridged on back, ¼ in. long.

A wide many-stemmed much-branched shrub occasionally fifteen feet in height, with slender somewhat zigzag lustrous branchlets marked with large pale oblong lenticels, orange-green during their first season, pale orange-color during their second year, and finally dark red-brown, and armed with numerous straight lustrous spines usually ½ in. in length.

Flowers during the first week in June. Fruit ripens late in September and hangs on the branches until long after the leaves have fallen.

Vermont, open grassy slopes of Bald Mountain, Shrewsbury, *W. W. Eggleston*, October, 1899, *Eggleston & Sargent*, June, 1900,

Brainerd & Sargent, September, 1900, St. Albans, *E. Brainerd*, September, 1900.

C. asperifolia. Leaves oval, acute or acuminate, cuneate or on leading shoots rounded at the base, slightly divided above the middle into numerous short acute lobes, coarsely and doubly serrate with glandular teeth, mostly entire toward the base, thick and firm in texture, dark green, lustrous and roughened above with short pale persistent hairs, pale and glabrous below, 2½ to 3 in. long, 2 to 2½ in. wide, with thin midribs slightly impressed above and slender primary veins arching to the points of the lobes; petioles slender, somewhat winged at the apex, often red below the middle, ¾ to 1 in. in length. Flowers ¾ in. in diameter, in broad many-flowered thin-branched glabrous cymes; bracts and bractlets linear, glandular-serrate; calyx-tube narrowly obconic, glabrous, the lobes lanceolate from broad bases, elongated, acute, glabrous, obscurely glandular-serrate especially below the middle, often bright red toward the apex; stamens 10; filaments stout, elongated; anthers large; styles 3 or 4, surrounded at the base by small tufts of pale hairs. Fruit drooping in few-fruited open clusters, oblong, bright scarlet, ½ in. long, ⅓ in. thick; calyx cavity deep and narrow, the lobes elongated, appressed, bright red on the upper surface toward the base; flesh yellow, thick, dry and mealy; nutlets usually 4, light-colored, rounded and sometimes obscurely grooved on the back, ¼ in. long.

A shrub 5 or 6 feet in height with stout glabrous dull chestnut-brown branchlets marked with oblong pale lenticels, becoming ashy gray during their second season, and armed with slender nearly straight spines from 1½ to 2 in. in length.

Flowers at the end of May. Fruit ripens about the first of October.

VERMONT, Middlebury and New Haven, *E. Brainerd*, May and September, 1900.

ARNOLD ARBORETUM.

SCIRPUS ATRATUS A SYNONYM OF SCIRPUS PECKII.

EZRA BRAINERD.

SCIRPUS PECKII, Britton, (Trans. N. Y. Acad. Sci. XI: 82, 1892,) was based upon specimens collected by Professor Peck in the Adirondack region of New York and upon specimens from Connecticut. Dr. Britton considered both these collections as representing *Scirpus polyphyllus*, var. *macrostachys*, Boeckeler, which he thought worthy of specific rank; and as the name "macrostachyus" had been used before in the genus, he called the new species *Scirpus Peckii.*

On looking at these type specimens last March with Dr. Britton, I was surprised to note that Prof. Peck's plants did not seem to differ from the *Scirpus atratus* of Mr. Fernald, published in Rhodora II: 18, 1900. A careful comparison of further material of the Adirondack collection, kindly given me by Prof. Peck, with type specimens of Mr. Fernald's proved beyond doubt their identity. At the same time it appeared that they were quite distinct from the Connecticut plant. The spikelets of the latter are brown, of the former blackish; the achenes of the latter are much larger than those of the former; the bristles of the latter are comparatively short, and closely barbed, those of the former are over twice the length of the achene, and with scattered barbs. Dr. Britton, then, it seems, had before him in the material on which *S. Peckii* was founded two distinct things, probably of distinct geographical range: (1) the blackish plant of the northern mountains, represented by Professor Peck's collection from the Adirondacks, to which the name *S. Peckii* must be restricted; and (2) the ferruginous plant of southern New England and southward, which Boeckeler, as it seems to us, correctly disposed of as a long-spiked variety of *Scirpus polyphyllus*, Vahl. In the cut of *Scirpus Peckii* in the Illustrated Flora (fig. 633), while the umbel and spikelet are from the Adirondack plant, the achene with its bristles is apparently from the Connecticut plant (compare with the achene in fig. 632). A specimen of the Connecticut plant in the Gray Herbarium was named *S. Peckii* by Dr. Britton; and naturally Mr. Fernald on seeing specimens of the other species from Vermont and New Hampshire failed to recognize it as *S. Peckii*, and published it as *S. atratus*.

A few additional facts regarding this beautiful species — the true *Scirpus Peckii*, Britton — may be of interest. According to Rhodora II: 17, Mr. Edwin Faxon is supposed to have first discovered it at Sutton, Vermont, in 1881. But Professor Jesup of Dartmouth College collected it in the vicinity of Hanover, N. H., Aug. 21, 1878. Soon after he sent me a specimen, querying if it was *S. Eriophorum* long gone to seed, and remarking that it looked odd. For several summers I was on the lookout for something to match it, but collected only forms of what Mr. Fernald has since distinguished as *Scirpus atrocinctus*. It was not until July 17, 1898, that I found a single plant of *S. Peckii* on the border of a peat-bog in the Green Mountains at an altitude of 1300 ft. This was sent unnamed to the Gray

Herbarium, and together with Mr. Faxon's plant and specimens collected by Mr. Fernald in New Hampshire in 1899 formed the original material of *S. atratus*.

The past summer I spent several days searching for further specimens in the mountains of Vermont. In a drive of over seventy miles I found single plants of two or three culms each in six stations miles apart. At last, however, at a lower altitude of about 500 feet it was seen in abundance in a moist meadow of coarse alluvium brought down by a mountain brook. Afterward in August I found it plentifully in the upland meadows of Wallingford in Rutland County. It is not a plant of bogs or wet places, like *S. cyperinus*, *S. atrocinctus*, and *S. rubrotinctus*; but affects a moist, heavy soil. The fruit begins to ripen and to drop by the middle of July, while the tips of the spikelets are still in flower. It is surely a welcome addition to the mountain flora of New York and New England, in spite of the misfortunes that have attended its christening.

Middlebury College.

NOTES ON THE FLORA OF RHODE ISLAND.

Wm. Whitman Bailey.

Mr. Joseph W. Congdon, for many years the leading systematic botanist in Rhode Island, and now residing at Mariposa, California, sends me interesting notes elicited by my recent article in Rhodora. The localities of which I did not know the present names have been explained by him and others; thus "Tifft's" or Teft's Woods" were on Federal Hill, near the present Atwell's Avenue; "Triptown" is now our suburb, Manton; while "Tar-kiln" is a station on the Pascoag Railroad. Mr. Congdon writes: —

"Years ago *Utricularia purpurea* belonged to Little Benedict Pond, while around the borders grew *Coreopsis rosea*, *Fuirena*, *Hemicarpha*, etc. I presume your Pawtucket locality is either Spectacle Pond, back of the old Lindsay Tavern, or another pond on the southerly side of the turn-pike, about half a mile distant. The *Eupatorium hyssopifolium* (also *aromaticum*) indicate Spectacle Pond, the sole Rhode Island habitat for *Psilocarya*. *Carex Olneyi*, I was long ago satisfied, is nothing but a bybrid of *C. utriculata* with probably *C. monile*. Its ovaries were uniformly abortive. I dis-

cussed the matter once with Olney, himself, and he was more than half inclined to agree with me.

Drosera longifolia, as we called it then, grew in Olneyville swamp and in the swamps between that village and the head of the cove. I suppose by this time the old swamp is all filled up. It was a great locality. *Carex exilis*, *C. teretiuscula*, *Epilobium molle* (so we termed it then), and many other things belonged there. I believe I gathered the last specimens of Linnaea at Mr. Olney's locality. When last I visited the spot the plant had been all 'improved' away. It grew in Connecticut ten miles west of the Rhode Island line in just one spot. It may, however, easily occur in Fiskeville or Burrillville."

[The one and only Linnaea locality was quite near the then sadly neglected grave of Esek. Hopkins, first commander of the American Navy. — W. W. B.]

"With regard to the orchids, Bigelow's *Habenaria fimbriata* is now *H. psycodes* and his *psycodes* the modern *lacera*, while he makes what is now *fimbriata*, *grandiflora*. So also his *Corallorhiza odontorhiza* is, I am satisfied, *C. multiflora*, Nutt., which is twenty times more common in New England. In fact, I never saw *C. odontorhiza* in Rhode Island but once, in Warwick. In after years the same locality was entirely barren. Bigelow's *Myriophyllum procumbens* is the half terrestrial form of *M. ambiguum*, Nutt., and to be found (in my day) in both forms at Little Benedict Pond. *Lygodium* I never saw growing except at Quinsnickett, Smithfield, where it was introduced. There is another locality in Burrillville."

[My own locality, in South Scituate, was, when I last visited it, about 1880, a fine one. The copse near the water was full of it. — W. W. B.]

"I wonder whether the old salt marsh where Olney first found *Scirpus Olneyi*, still remains. Even in my time they had put a road through leaving the original patch upon one side. It is far from uncommon in California."

Brown University.

Baptisia tinctoria as a Tumble-weed.— Referring to Dr. Beal's list of "Tumble-weeds" I may say that a number of years ago I found *Baptisia tinctoria* (L.) R. Br. growing as a tumble-weed on

Martha's Vineyard, Massachusetts. It assumed a nearly spherical form late in the season, and early in the winter broke away just at the ground with an almost circular fracture. It rolled over the Vineyard hills in a manner quite like that of the tumble-weeds of the Great Plains.— CHARLES E. BESSEY, University of Nebraska.

TWO ERODIUMS AT TEWKSBURY, MASSACHUSETTS. — It is not often that the collector, who has botanized for many years, in the country about his home, is afforded the keen pleasure of meeting with a species new to his experience. It was, therefore, an unmixed delight for me, to discover in a neglected field at Tewksbury, Massachusetts, two species of *Erodium* which proved on examination to be *E. cicutarium*, L' Her., and *E. Botrys*, Bertol. Notwithstanding the lateness of the season (Nov. 4, 1900) which gave an additional zest to the pleasure of discovery, both species bore abundant flowers and fruit and the foliage was fresh and green.

Erodium cicutarium is given in most of our manuals and local floras as of occasional occurrence, but *E. Botrys* is mentioned for this region only in the Flora of Middlesex County, where the only locality given is "Westford, Woolen-Mill Yard (Dr. C. W. Swan). A native of South Europe but introduced in California wool."

Wishing to secure additional material, as I found that but few of my botanical friends had collected these plants, I visited the locality again a week later, in company with other enthusiastic collectors. Although a severe frost had occurred in the interim, we again found the plants in excellent condition and without difficulty traced their origin to many tufts of wool-waste which remained on the field here and there. While we were carefully examining the acre of land where these plants grew, the owner of the farm strolled up to us, wondering no doubt what kind of treasure or what form of insanity could induce four respectable looking city men to wander up and down his old turnip patch, digging up now and then a weed and clapping it into a tin box. On inquiry from him we learned that the field had been dressed some years before with wool-waste, from the Stirling Mills at Lowell. This seems to be the form of conveyance selected by Erodium, therefore when you meet one of the species, do not conclude it is native, but look for wool-waste.— EMILE F. WILLIAMS, Boston, Massachusetts.

Botrychium matricariaefolium in Connecticut.— On July 4th, 1896, several specimens of *Botrychium matricariaefolium*, Braun, were collected in West Hartford, Connecticut, near the summit of the Talcott Range. Of the discovery no special record was made, as the plant was not known to be uncommon in the State. A single specimen in my herbarium and one in that of Mr. C. A. Weatherby, who was collecting with me at the time are the only ones preserved from this station. One of these, sent to Mr. Merritt L. Fernald of the Gray Herbarium for identification was verified as "good *Botrychium matricariaefolium*." In the issue of Rhodora for June, 1900, this plant is reported from Southbridge, Massachusetts, that being the most southern station known in New England. The discovery of the Talcott Mountain station (altitude about 650 feet) not only extends the range some few miles southward but adds a new and desirable plant to the flora of Connecticut.— A. W. Driggs, East Hartford, Connecticut.

Extended ranges in Cyperus and Hieracium. — *Cyperus microdontus*, Torr. (*C. polystachyus*, Rottb. var. *leptostachyus*, Boeckl., Gray's Man. 6th Edit.), given in our manuals as "Virginia to Florida and Texas," was collected Sept. 2d, 1900, by the writer on the shore of Clay Pit Creek near Navesink, Monmouth Co., New Jersey.

Hieracium vulgatum, Fries, reported in Britton & Brown's Illustrated Flora as "Labrador and Newfoundland to Quebec and in southern New York and New Jersey. Probably introduced. Also in Greenland, Northern Europe and Asia," was found on July 28th, 1900, by J. Franklin Collins and the writer, growing in abundance along the shores of the Allagash river, near its confluence with the St. John river, Aroostook County, Maine. This was the typical form and it appears to be its first discovery in New England. Mr. M. L. Fernald has already reported the appearance of *H. vulgatum*, var. *irriguum*, Fries, which he discovered on the cliffs of the Penobscot river and its tributaries.

Hieracium pratense, Tausch, given in Britton & Brown's Illustrated Flora as "Dongan Hills Staten Island, N. Y." was found on July 19, 1900, by J. Franklin Collins and the writer at Van Buren, Aroostook County, Maine. It was growing along the railway near the station.

This is believed to be the first report of its occurrence in New England. — EMILE F. WILLIAMS, Boston, Massachusetts.

[Studies of American Fungi. Mushrooms Edible, Poisonous, etc. By George Francis Atkinson, Professor of Botany in Cornell University; Ithaca, N. Y., Andrus and Church, 1900; 275 pages, 200 illustrations from photographs, besides colored plates and other figures. $3.00.]

MR. ATKINSON'S book makes immediately a favorable impression by the number and excellence of its illustrations. They are from photographs taken by the author and represent over one hundred and fifty species as they actually look in nature — lacking, of course, the color. To color, however, it must be said, a beginner is prone to give much too great importance, not having any experience with its variability in these plants. Thus it is no real disadvantage to the student to be forced to attend to details of texture and structure, such as the camera can faithfully record. Particularly is this true in the first steps of study, when attention must be paid to characteristics by which genera are discriminated, for in the acquirement of facility to distinguish one genus from another, color, except that of the spores, plays a small part. It is one of the objects of the author, as he states in his introduction, to present typical forms of nearly all of the genera of the gilled mushrooms, and he has succeeded admirably. His material is well chosen, and there is abundance of it, some common species, such as *Agaricus campestris*, *Amanita phalloides*, *A. muscaria*, and *Coprinus comatus*, being shown at different stages of development and in a variety of aspects. The few colored plates attempted are on the whole acceptable, but we can be glad that they are not more numerous.

It is evident, however, from a study of Mr. Atkinson's plates, as it has been from the photographs of Mr. Lloyd of Cincinnati, that the camera can be relied on for more than generic distinctions. Except in a small percentage of cases a good photograph will preserve even the individuality of a species. To attain this object, care and skill must be shown in the collection and arrangement of material, as in Mr. Atkinson's work. With such photographs, for instance, as those of *Hydnum coralloides*, *H. erinaceus*, and *H. caput-ursi*, in the hands of amateurs, we may hope that the reports of finding *H. caput-Medusae* will become much less frequent.

There is strong inclination, then, to speak only in praise of Mr.

Atkinson's illustrations. If fault were to be found at all, it would be with figures 85 (*Armillaria mellea*), 123 (*Cantharellus cibarius*), and 201 (*Dictyophora duplicata*), which certainly do not adequately present these species.

The descriptive part of the text is much more than a running accompaniment to the illustrations. Most of the descriptions are from actual observations of the author, and are not mere copies of the stingy, technical diagnoses of ordinary systematic works. Besides ample notes of color, structure, variability, habitat, etc. are frequently appended details of microscopic structure. It must be said, however, that comparison of related species would be facilitated by greater fullness in some cases. Why, for example, may we not have the spore-measurements of *Amanita phalloides* to compare with those of *A. floccocephala*? To be sure the measurements of other observers can easily be referred to, but we want to compare Mr. Atkinson with Mr. Atkinson.

Besides the systematic part of the book, which forms the bulk of the volume, there are introductory chapters on structure and development, copiously illustrated, the substance of which has already appeared in the Bulletins of the Cornell University Agricultural Experiment Station. There are also chapters on "The Collection and Preservation of the Fleshy Fungi," on the "Selection and Preservation of Mushrooms for the Table," on "Recipes for Cooking Mushrooms" (by Mrs. Sarah Tyson Rorer), on the "Chemistry and Toxicology of the Fungi" (by J. F. Clark), and on "Structural Characters" (by H. Hasselbring), all of which are admirable in their way and increase the value of the book to people at large.

In spite of its good qualities, the book as a whole somehow lacks symmetry and unity. It is not aimed at any one class of readers. In the main intended for popular use it yet contains, perhaps to the surprise of some botanists, descriptions of several proposed new species, though the first medium at hand has often enough before been utilized for such a purpose. Ordinary readers, too, can hardly be interested in illustrations of such species as *Boletus obsonium*, *Pleurotus sulphuroides*, and *Armillaria aurantia*, especially when they will search the pages in vain for many of the commonest species which awaken prompt inquiry, the moment the eager mushroom hunter gets his eyes open. Scant mention of species, such as often occurs, as on pages 48 (*Panaeolus fimicola*, etc.) 90 (*Clitocybe cyathi-*

formis) 152 (*Pholiota aurivella*), and elsewhere, is of no possible use in such a book. It gives no information to anybody. A puzzle in synonymy is offered to inexperienced readers on pages 16 and 17, where the bewildering nature of the "ambiguous trametes" is exemplified by treating it as *Trametes* in the text, and as *Daedalea* in the accompanying figure — all without a word of explanation. This is the more remarkable in view of the absence of any treatment (other than this brief obscure mention of a single species) of the common genera *Trametes*, *Daedalea*, and *Lenzites*, and is one of the many indications that might be cited that the book has been hurried to publication before all the matter that properly belongs in such a popular exposition of the more important genera was assembled.

To insist on the absence of a definite plan in the book, other than that of getting a certain amount of available material between two covers and thus catching the market, would perhaps be unjust in view of what is told us in the introduction, where the author says:

"Since the issue of my 'Studies and Illustrations of Mushrooms,' . . . . there have been so many inquiries for them and for literature dealing with a larger number of species, it seemed desirable to publish in book form a selection from the number of illustrations of these plants which I have accumulated during the past six or seven years."

Yet, by the author's own admission, the contents of the book are to some extent the result of accident. In this respect the book compares unfavorably with Cooke's well known "British Edible Fungi," which selects a few conspicuous species, or even with Mr. McIlvaine's tome, which attempts to include all American fungi known to be edible.

Passing from general considerations to the criticism of certain details, such as the spelling of generic and specific names, we find too many examples of unscholarly oversight and error. Some instances of carelessness in the proof reading are conspicuous, as ENTOMOLA p. 143, and again on p. 144; fuligineus, hygrophanus (as English words) p. 266. Other errors can hardly be set down to the same cause, particularly when the inaccuracies of the text are accurately reproduced in the legends of the plates and in the index. The following may be cited: *Amanita caesaria* (caesarea), p. iv, and pl. 19; *Hebeloma crustinuliforme* (—tulin—), p. 158 and fig. 148; *Pluteus tomentosulsus* (—ulus) p. 139, 140; *Boletus luridis* (— us), p.

249 (three times); *Annelaria* (Anellaria) p. 265. And furthermore what is to be thought of the following?—*Tricholoma aurantia*, p. 86, *Calostoma cinnabarina*, p. 212, 213, and pl. 72. Yet we find the author on page 168 holding up his hands (if that be the interpretation of his exclamation point) at Mr. Lloyd's "*Flammula rhodoxanthus*!"

Of minor importance, yet perhaps worth a comment, is the inconsistency shown in retaining Vittadini's original spelling *rachodes* (in *Lepiota rhacodes*) while changing Fries's *pargamenus* (in *Polystictus pergamenus*). Is it not better to spell *rhacodes* correctly?

Nine "new species" are described and illustrated: *Amanita floccocephala*, *A. velatipes*, *A. cothurnata*, *Lepiota asperula*, *Mycena cyanothrix*, *Hypholoma rugocephalum*. *Bolbitius variicolor*, *Paxillus corrugatus*, and *Hydnum putidum*. Of certain of these a fuller discussion would be welcome. *Amanita floccocephala*, for instance, does not stand out clearly from *A. phalloides*; *A. cothurnata*, suggests Peck's *A. crenulata*, both in description and figures; *Mycena cyanothrix* seems too close to *M. cyaneobasis* Peck, which is admittedly near *M. calorhiza* Bres. a species identified by some with *M. Iris* Berk.; yet there is nothing to show that the older species were studied in connection with the forms proposed as new.

To the great and increasing number of people who want information about our mushrooms Mr. Atkinson's "Studies" will be as helpful as any single book obtainable. It is certainly the best collection yet published of illustrations of our species.

The long expected Flora of Vermont[1] by Messrs. E. Brainerd, L. R. Jones, and W. W. Eggleston has just been issued. It covers the ferns and seed-plants of the State and bears evidence of great care in its preparation, indeed it is probable that no local flora has been compiled with more conscientious effort to present in well-judged form the results of recent segregation among American flowering plants. The editors have wisely chosen a conservative course in nomenclature. This welcome addition to the literature of New England botany is gracefully and appropriately dedicated to New England's veteran collector, Cyrus Guernsey Pringle.

[1] Contrib. to Bot. of Vermont viii, extracted from the 20th Vermont Agric. Report, 8vo. 113 pp.

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FERNS OF MT. TOBY, MASSACHUSETTS.

Maria L. Owen.

The description in Rhodora[1] of the delightful fern ravine in Thetford, Vermont, moves me to tell of our Western Massachusetts fern paradise. This is Mt. Toby, five or six miles north of Amherst, a favorite resort of botanists for other growths as well as ferns. Mr. Solomon Stebbins of Springfield tells me that within a circle not over two miles in diameter some fifty species and varieties of ferns (including some of the allied Adder's Tongue family) may be found, — the exact number hard to state on account of the varieties, for some of these are ill-defined and it is difficult to know whether to count them or not. The diversity of surface affords a suitable habitat for the rock and the wood ferns, those that love pasture, meadow, marsh or brookside, and so we have first, eighteen of the nineteen in the Thetford list, all common; but the nineteenth, *Aspidium aculeatum*, var. *Braunii*, does not grow in our State so far as known. *Cystopteris fragilis* and *Onoclea sensibilis* can always be found finely fruited. *Asplenium angustifolium*, though local, is abundant in spots, and *Aspidium acrostichoides*, var. *incisum*, not infrequent.

Mt. Toby gives us in addition the following: *Pellaea gracilis* grows in crevices, on shaded rocks and at the foot of dripping ledges, while *P. atropurpurea* can always be found on certain dry rocks, but is not so common. *Asplenium Trichomanes* and *A. ebeneum*, and a form of the latter with incised pinnae also occur, together with *A. Filix-foemina* and several variations — *Michauxii*, *rigidum*, *laciniatum* and *exile*, whether allowed as varieties or only forms. These grow

[1] Vol. ii, 229.

anywhere, but *A. Ruta-muraria* is scarce,— only one patch on rocks within this circle.

We find the Walking-leaf — to use Dr. Bigelow's English name for the *Camptosorus* — but a pretty habit that it has may be the death of it. Growing amongst mosses and other low plants that need but little depth of soil, and whose interlaced roots weave the whole together, it frequently carpets the flat tops of rocks,— a beautiful sight which draws the attention even of idle picnickers who, not realizing that they are destroying years of growth, find it amusing to peel off these mats and then, without a pitying thought, throw them on the ground to die. Thus they have laid bare the rocks within sight of their walks; but away from the paths the interesting fern is still common.

The three species of Phegopteris, *P. polypodioides*, *P. hexagonoptera* and *P. Dryopteris* are common; the Aspidiums, *A. Thelypteris*, *A. Noveboracense*, *A. spinulosum* with var. *intermedium* and *A. Boottii* are everywhere, while *A. cristatum*, var. *Clintonianum* is not so common. *Cystopteris bulbifera* edges the brooks and drapes the wet rocky banks with a luxuriant growth, the elegantly tapering fronds often three feet long, and the rhachis thickly set with bulblets. *Woodsia obtusa* is fairly common on rocks, but disappears as we go up and is replaced by *W. Ilvensis*. The three Osmundas grow wherever the situation suits them, and var. *frondosa* of *O. cinnanomea* may be found any year when there has been a late spring frost to check the development of the unrolling fronds; — so I am told by Dr. W. H. Chapin, who is, like Mr. Stebbins, very familiar with the mountain.

Of the Adder's Tongue family, first in interest is perhaps *Botrychium simplex*. One happy year Mr. Stebbins, with a friend's help, counted over eight hundred plants in a space ten rods by seven or eight in extent, and that after he had collected freely for pressing; it took sharp eyes to detect the delicate little things, but the census takers went down and crept on hands and knees as long as specimens showed themselves. A few came up in the same place the next year, but after that no more; still at the right season one who knows the mountain can find the plant in some spot. *B. Virginianum* grows in the woods, *B. ternatum* in its varieties *australe* and *intermedium* in the sugar orchards, and vars. *obliquum* and *dissectum* in pastures. *Ophioglossum vulgatum* comes up in solid clumps and then mysteriously disappears and has to be sought in some other place, but it is soon found.

This closes the list of Mt. Toby ferns. There are only five more in this part of the state, *Woodwardia Virginica* and *W. angustifolia*, *Lygodium palmatum*, *Botrychium matricariaefolium* and *B. lanceolatum*. We cannot credit our beloved mountain with these, but are well satisfied with the thirty-seven to fifty kinds — according to the number of varieties that one chooses to admit —which we can collect in one day within the sweep of our one mile radius. Our Mt. Toby plants are more scattered than those of the charming Vermont fern garden, and we have to work harder for them, but, considering their number and the rarity of some, we think our paradise worthy of a place in a botanist's heart, beside that other delightful spot.

SPRINGFIELD, MASSACHUSETTS.

THE NORTHEASTERN CARICES OF THE SUBSECTION VESICARIAE.

M. L. FERNALD.

THE species of Carex ordinarily referred to the *Vesicariae* have been, with the possible exception of the *Rigidae* and the *Ovales*, the source of our greatest difficulty in studying that genus in Eastern America. Nearly all the forms now known in our flora have been from time to time associated with two or more so-called species, a divergence of treatment readily seen between the first and the sixth editions of Gray's Manual. In the first edition Carey recognized as American species *C. vesicaria*, L. and *C. ampullacea*, Good., of Europe. In subsequent editions other European species of the group, *C. rotundata*, Wahl., and *C. pulla*, Good., were recognized as belonging to our flora. Gradually, however, the American plants which once passed under those names, have been set apart, one by one, as distinctively American species, and for the American *Carex vesicaria* we have *C. monile*, Tuck.; for our *C. ampullacea*, *C. utriculata*, Boott; for American *C. rotundata* and *pulla*, *C. miliaris*, Michx. A study of some recently collected material has convinced the writer, however, that there is little reason for separating many American plants from the Old World species which they represent.

Recent authors have recognized in eastern America three species of the *saxatilis* (*pulla*) group. Of these *C. oligosperma* and *C. compacta* are clearly marked and perhaps of purely American range.

The other plants have all been referred to *C. miliaris*, Michx., an American species.

The botanical party[1] which recently explored a portion of Mt. Katahdin in Maine found two species of this group growing about the ponds upon the lower slopes of the mountain. One of these, a low plant with broad flat leaves and small purple spikes of nerveless perigynia is exactly the *C. saxatilis*, L. (*C. pulla*, Good.) of northern Europe. The other, a taller plant with yellowish-green or brownish spikes of nerved perigynia, is a good match for the original material of *C. Grahami*, Boott, of Scotland. Most of the Katahdin *C. saxatilis* is identical with the Hudson Bay plant so treated by Prof. Bailey, but a few plants found at a second station show the involute leaves characteristic of *C. miliaris*. Now by Carey and Gray and formerly by Prof. Bailey, *C. miliaris* was treated as a form of the European *C. saxatilis* (*C. pulla*), but recently Prof. Bailey has separated Michaux's *C. miliaris* as an American species taking for his distinctions the narrower leaves and paler narrower spikes of the latter plant. That the breadth of leaf is not constant is very apparent in specimens from Mt. Katahdin. The spike in good *C. miliaris* varies much in length and is often as short as in *C. saxatilis*, and the purple-brown perigynia of Robinson & Schrenk's Newfoundland plant (No. 87 — in all other points good *C. miliaris*) show that the color-character has little final value.

As already stated the taller plant growing by Depot Pond at the entrance to the Basins of Mt. Katahdin is *C. Grahami* of Scotland. This very rare species was described by Francis Boott from material collected by Wight on cliffs at Glen Phee, Clova, and the Katahdin plant is apparently identical with the original material, with which it has been carefully compared. The American plant described by Prof. Bailey as *C. miliaris*, var. (?) *aurea*, ordinarily has slightly narrower spikes than the Glen Phee and Katahdin specimens of *C. Grahami*, but most of the material of that form yet examined is immature. The perigynia, however, are inflated and nerved as in *C. Grahami* so that little hesitation is felt in placing the plants with that species. It is doubtful, though, whether most of the Rocky Mountain specimens which have sometimes been referred to *C.*

[1] J. R. Churchill, J. F. Collins, M. L. Fernald, G. G. Kennedy, and E. F. Williams.

Grahami are the same as the plant of Scotland and Northeastern America, a view already broached by Prof. Bailey.

Among the puzzling forms of this group collected by Messrs. A. H. & C. E. Smith at the outlet of Moosehead Lake was one plant which was doubtfully referred by Wm. Boott to *Carex rotundata*, Wahlenberg, of Scandinavia. The plant was so treated in the fifth edition of Gray's Manual, and in his Synopsis of the Genus Carex[1] Prof. Bailey interpreted it in a similar way. Subsequently, however, the American specimens have been referred by him to *C. miliaris*. *C. rotundata* of Wahlenberg has always been a little-known and poorly understood species. Much of the European material so named is referable to *C. saxatilis* and perhaps to our American *C. compacta*. In the Gray Herbarium there is, however, one sheet which may be taken as authentic. One of the specimens collected by Wahlenberg, himself, was sent by Francis Boott to his brother, William Boott. By these authors the specimen was accepted as authentic, as it was also by Olney who wrote upon the sheet "The plant from Wahl. just typical C. rotundata." A second specimen, from Greenland, is a perfect match for Wahlenberg's plant, and the Moosehead plant, though immature, is habitally like it, and the perigynia in their texture and nervation are essentially the same It is still doubtful, however, whether the species is truly distinct from *C. saxatilis* and *C. miliaris*.

For many years the commonest form of the plant now passing as *Carex utriculata* was treated by both American and European authors as identical with the European *C. rostrata*, Stokes (*C. ampullacea*, Good.). Under the second of these purely synonymous names the plant was described by Carey in four editions of Gray's Manual. The plate of *C. ampullacea* in Francis Boott's great monograph was drawn from a Saskatchewan specimen, and Professor Bailey in 1886 treated the American and the European plants as identical. Subsequently, however, he maintained that the American plant is distinct from the European in its "grosser habit, lack of stoloniferous character, broader and proportionately shorter leaves, heavier and more scattered spikes, of which the lower are less peduncled, and much sharper scales."[2] A careful study of much material fails to convince the writer, however, that the medium-sized form of the Ameri-

[1] Proc. Am. Acad. xxii (1886), 67. [2] Mem. Torr. Club, i. 60.

can plant (*C. utriculata*, var. *minor*, Boott) is in any way different from the European. In New England and adjacent Canada where the plant has been watched for some years the spikes vary extremely in size and compactness, and in these characters as well as in that of the scale the American plants are perfectly matched by the equally diverse European specimens. Professor Bailey's statement that the American plant is not stoloniferous cannot be founded upon study of carefully prepared material. It is true that most of the older herbarium specimens, hastily pulled up or broken off, show no stolons, but very many of recent collection, both in the Gray Herbarium and that of the New England Botanical Club, exhibit long stout stolons often a foot in length. This preservation of the stolons in the American specimens is doubtless due to the greater care exercised by recent botanists in the collection of their material. The original *Carex utriculata* of Boott is the coarsest form of the American plant, with perigynia often nearly 1 cm. long. As an extreme it is well marked but with many transitional specimens constantly occurring it cannot be maintained as a species and must be treated, as was done by Carey and formerly by Bailey, as a variety of the European species.

The plant described by Francis Boott as *Carex Olneyi* has been treated by Professor Bailey as a hybrid between *C. bullata* and *C. utriculata*. This view of the plant is based largely upon the fact that the Providence specimens are "sterile or nearly so." The same plant was collected abundantly by Wm. Boott in a swamp in eastern Massachusetts, and Mr. Canby gets it at different stations in Delaware. At these stations the plant though often sterile is no more so than is often the case in *C. utriculata* and various other species. These Carices being anemophilous must frequently be quite sterile, for, depending as they do upon gusts of wind to bring them pollen, large areas of the plant may readily remain unfertilized if the wind happens to take the pollen away from the colony, and especially if the plant is not a common one. Such sterile specimens of not only *C. Olneyi*, but *C. Grahami*, *C. rostrata* and its var. *utriculata*, *C. bullata*, *C. monile*, and many other species are familiar to most botanists who know these plants in the field. The sterility of many specimens of *C. Olneyi* does not seem to the writer sufficient ground for treating it as a hybrid. Furthermore, the perigynia of this plant are smaller than are those of *C. bullata*, and if it be considered a hybrid we must

assume that its other parent is a plant with perigynia likewise smaller than in *C. bullata*. The only form of *C. utriculata* (as treated by Professor Bailey) which meets this demand is var. *minor*, Boott (*C. rostrata*, Stokes), which, as represented in the Gray Herbarium, seems to grow no further south than Connecticut. It hardly seems probable, then, that *C. Olneyi*, a plant occurring from eastern Massachusetts to Delaware, has any genetic affinity with *C. rostrata* (*C. utriculata* in part of Bailey). The species is, however, so close to *C. bullata* in its varying forms that it seems better treated merely as an extreme variation from that type.

In the first four editions of Gray's Manual Carey recognized *Carex vesicaria*, L., of Europe as an American plant and the plate of that species in Boott's Illustrations was drawn from an Ohio specimen. In the fifth edition of the Manual, however, Dewey's *C. Vaseyi* was taken up in its stead, a plant said to differ from the European *C. vesicaria* "in the more pointed scales and fewer-nerved perigynia tapering gradually into a longer beak." In 1886, however, Professor Bailey united with Tuckerman's *C. monile* the *C. Vaseyi* of Dewey, and since then the American plant which was long treated either as *C. vesicaria* or *C. Vaseyi* has passed as identical with Tuckerman's species. That the American *C. vesicaria* (*C. Vaseyi*) passes directly into *C. monile* there can be no doubt, but a study of European specimens from Francis Boott, Fries, Blytt, Hooker, and others shows no appreciable nor constant differences between the European and American plants. Furthermore good *C. monile* occurs in Transylvania at least, and a northern extreme of our American plant is well matched by *C. vesicaria*, var. *distenta*, Fries, of Scandinavia. *Carex Raeana*, Boott, a beautiful northern plant which apparently has been collected at only two stations, the original of Richardson near Methye Lake in Athabasca, and the shores of Lake St. John at the head of the Saguenay, is treated by Professor Bailey as a variety of *C. monile*. The typical *C. Raeana* is indeed very unlike the latter species, but Pres. Ezra Brainerd has collected at Lake St. John material which shows it to pass directly into typical *C. vesicaria*.

Carex Tuckermani, *C. bullata*, *C. retrorsa*, and *C. lurida* are apparently distinctive American plants, and their treatment is not obscured, like that of some of the species here discussed, by the rather scattered descriptions of European forms. *C. Tuckermani* and *C. bullata*

are tolerably constant in their tendencies, but *C. retrorsa* and *C. lurida* are excessively variable and present many puzzling forms. The treatment of them here adopted is essentially that already proposed by Professor Bailey.

In the preparation of the following synopsis the writer has been greatly assisted by Pres. Ezra Brainerd, who has kindly loaned his northern material of the group, and by Professor John Macoun, who has allowed the use of the extensive collections of the Geological Survey Department of Canada. These two collections have satisfactorily supplemented the representation in the Gray Herbarium and the herbarium of the New England Botanical Club.

Synopsis of species and varieties.

* Perigynium not bladder-like nor conspicuously inflated; the beak with an entire or short-toothed orifice.

+ Perigynium nerved.

++ Spikes few-flowered, loose: mature perigynium rather firm, 5 or 6 mm. long.

C. oligosperma, Michx. Slender and tall (2.5 dm. or less high), with involute leaves: staminate spike usually 1; pistillate spikes 1 or 2, very rarely 3, at most 1.5 cm. long: the shining conic-ovoid perigynium ascending, nearly twice as long as the broad blunt purple-tinged scale. — Fl. ii. 174; Carey in Gray, Man. 567; Boott, Ill. i. 25, t. 63; Bailey, Proc. Am. Acad. xxii. 64, & Mem. Torr. Club, i. 64. *C. Okesiana*, Dewey, Sill. Jour. xiv. 351. *C. Despreauxii*, Steud. Syn. Pl. Cyp. 237 (acc. to Bailey, l. c. 69). — Bogs and wet shores, Labrador and Newfoundland to Pennsylvania, Minnesota, and the Saskatchewan.

++ ++ Spikes dense: perigynium smaller.

= Leaves flat.

a. Pistillate spike purplish: perigynium globose-ovoid, abruptly short-beaked, membranaceous, squarrose-spreading.

C. compacta, R. Br. Rather stout, 2 to 4 dm. high: staminate spike 1 (rarely 2), short-peduncled; pistillate spikes 1 or 2, very dense, sessile, erect, 1 to 3 cm. long, 7 to 9 mm. thick. — R. Br. in Ross, Voy. App. cxliii (nomen nudum), & in Dewey, Am. Jour. Sci. xxvii. 237, t. U, fig. 63; Boott, Ill. iv. 156, t. 502; Bailey, Proc. Am. Acad. xxii. 66, in part, & Mem. Torr. Club, i. 39. *C. membranacea*, Hook. in Parry, 2nd Voy. App. 406; Dewey, Am. Jour. Sci. xxix, 247, t. X, fig. 73. *C. saxatilis*, var. *compacta*, Dewey, Am. Jour. Sci. xi. 310. *C. membranopacta*, Bailey, Bull. Torr. Club. xx.

428. — Baffin Land (*Capt. John Ross*) and Northern Labrador (*Turner*) to Great Bear Lake (*Richardson*): perhaps also in northern Europe.

b. Pistillate spike yellow-green or merely purple-tinged: perigynium ovate, tapering gradually to the longer beak, ascending (*C. monile*, var. *Raeana* might be looked for here).

C. Grahami, Boott. Rather tall (4 to 7 dm.) and slender: staminate spikes 1 or 2, peduncled; pistillate spikes 1 or 2 (rarely 3), the lowest mostly short-pedicelled, slightly spreading or ascending, 1 to 3 cm. long, 6 to 9 mm. thick: perigynium submembranaceous, few-nerved, 4 or 5 mm. long, twice as long as the blunt or acute ovate pale or purple-tinged scale. — Trans. Linn. Soc. xix. 215; Syme, Eng. Bot. x. 172, t. 1684; A. Bennett, Jour. Bot. xxxv. 263. *C. saxatilis*, L., var. *Grahami*, Hook. & Arn. Brit. Fl. ed. 8, 510; Bailey, Mem. Torr. Club, i. 38, in part. *C. pulla*, Gray, Man. ed. 5, 602, not Good. *C. miliaris*, Michx., var.? *aurea*, Bailey, l. c. 37. *C. Raeana*, Britton & Brown, Ill. Fl. i. 295, fig. 682, not Boott. — Shores and marshy ground, Newfoundland, Exploits River (*Robinson & Schrenk*, no. 236): Quebec, East Main River (*A. H. D. Ross*); Lake St. John (*G. G. Kennedy, E. Brainerd*): Nova Scotia, North Ingonish, Cape Breton (*J. Macoun*, Herb. Geol. Surv. Dept. Can. no. 20,838): New Brunswick, Kennebeckasis (*J. Fowler*): Ontario, Chaudiere Falls, Ottawa (*Macoun*, Herb. Geol. Surv. Dept. Can. no. 7438, in part): Maine, margin of Depot Pond, entrance to Basins of Mt. Katahdin (*J. R. Churchill, E. F. Williams & M. L. Fernald*); outlet of Moosehead Lake (*A. H. & C. E. Smith*): British Columbia, Donald, Columbia Valley (*John Macoun*): Scotland, Glen Phee, Clova (*Wight*); and reported from a station in Perth.

= = Leaves soon becoming involute.

C. rotundata, Wahlb. Rather slender, 6 dm. or less high: staminate spike 1 (rarely 2 or 3), short-peduncled; pistillate spikes 1 or 2, sessile, short and compact, 8 to 13 mm. long, 6 to 8 mm. wide, the lower subtended by a divergent or somewhat ascending bract 4 or 5 cm. long: perigynium pale or ferrugineous, plump, membranaceous, few-nerved, subglobose-ovate, about 3 mm. long, tapering abruptly to the very short subentire or short-toothed beak, one half longer than the ovate purplish scale. — Act. Holm. 1803, 153, & Fl. Lap. 235; Gray, Man. ed. 5, 602; Bailey, Proc. Am. Acad. xxii. 67, in part, & Mem. Torr. Club, i. 39. — This name has been applied to numerous plants which are very different from the original plant of Wahlenberg. A specimen in the Gray Herbarium collected by Wahlenberg, himself, described above, and matched by a Greenland plant (*Warming & Holm*), is essentially the plant from Maine, outlet of Moosehead Lake, Aug. 24, 1867 (*C. E. Smith*). A specimen from the upper Mackenzie (*Tyrrell*) is probably the same.

+ Perigynium nerveless (or faintly nerved in exceptional specimens of var. *miliaris*.

C. saxatilis, L. Low (2 or 3 dm. high) with flat leaves, 0.5 cm. or less wide, nearly or quite equalling the culm: staminate spike 1 (rarely 2), short-peduncled or subsessile; pistillate spikes purplish, 1 to 3, sessile or the lowest short peduncled, subglobose or short-oblong, 0.5 to 2 cm. long, 5 to 8 mm. thick: perigynium purplish or purple-tinged, usually nerveless, ovate, 3 or 4 mm. long, tapering gradually to a short subentire beak, slightly longer than the acutish or blunt purple scale: stigmas usually 2. — Sp. 976; Bailey, Proc. Am. Acad. xxii. 65, & Mem. Torr. Club, i. 37. *C. pulla*, Good. Trans. Linn. Soc. iii. 78, t. 14; Smith, Eng. Bot. xxix. t. 2045; Fl. Dan. xvi. t. 2850.— Northern Europe and Greenland: Hudson Bay, North and South Twin Islands (*J. M. Macoun*): Ungava, Prince George's Sound (*R. Bell*, Herb. Geol. Surv. Dept. Can. no. 18, 795); Ungava River (*Spreadborough*, Herb. Geol. Surv. Dept. Can. no. 13,605): Labrador, Battle Harbor (*A. C. Waghorne*): Maine, margin of pond, Chimney Basin, Mt. Katahdin, alt. 925 m. (*J. R. Churchill, E. F. Williams & M. L. Fernald*).

Var. miliaris, Bailey. Slender and taller, 2.5 to 6 dm. high: leaves nearly filiform: pistillate spikes mostly paler and more slender, 1 to 2.5 cm. long, 3 to 7 mm. thick. — Bot. Gaz. ix. 120, & Proc. Am. Acad. xxii. 66. *C. miliaris*, Michx. Fl. ii. 174; Boott, Ill. i. 73, t. 200, fig. 2; Bailey, Mem. Torr. Club, i. 35 & in Gray, Man. ed. 6, 593. *C. pulla*, Good., var.? *miliaris*, Gray, Man. ed. 5, 602. *C. miliaris*, var. *obtusa*, Bailey, Mem. Torr. Club, i. 36. — Margins of rivers and lakes from Central Maine northward, rare. Newfoundland (*La Pylaie*); Exploits River (*Robinson & Schrenk*, no. 87); Grand Lake & Coal River (*A. C. Waghorne*, nos. 20, 23): Quebec, East Main River (*A. H. D. Ross*); Lake St. John (*A H. Smith, G. G. Kennedy, Ezra Brainerd*): New Brunswick, Rothsay & Richibucto (*J. Fowler*); Drury's Cove, St. John (*Wm. Boott*): Maine, outlet of Moosehead Lake (*A. H. & C. E. Smith*).

Var. **rhomalea**. Coarser throughout than the last, mostly taller: the stouter culm rather thick at base: the coarser leaves involute: spikes mostly thicker and longer. — *C. miliaris*, var. *major*, Bailey, Mem. Torr. Club, i. 36. — Labrador (*Turner*); Seal Lake (*Spreadborough*, Herb. Geol. Surv. Can. no. 13,481): Quebec, Jupiter River, Anticosti (*J. Macoun*); Lake Mistassini (*J. M. Macoun*): Maine, outlet of Moosehead Lake (*T. C. Porter*).

* * Perigynium turgid, often bladder-like; the beak sharply bidentate.

+ Scales smooth or only the lowest serrulate.

++ Perigynium turgid, but not conspicuously bladder-like: culm thick and spongy at base, generally smooth and bluntly angled above: leaves prominently nodulose.

C. ROSTRATA, Stokes. Culm 0.3 to 1 m. high, rather stout: leaves elongated, flat, usually equalling or exceeding the culms, pale green or glaucous, 0.2 to 1 cm. wide: staminate inflorescence mostly peduncled, of 2 to 4 distinct spikes; pistillate spikes mostly 2 to 4, sessile or the lower peduncled, cylindric, dense, 2 to 10 cm. long, 6 to 12 mm. thick: perigynium ascending or slightly spreading, ovate, flask-shaped, 3 to 6 mm. long, rather abruptly contracted to the cylindric beak, somewhat exceeding the bluntish or acute oblong or lanceolate purple-tinged scale. — Stokes in With. Arrang. Brit. Pl. ed. 2, 1059; Bailey, Proc. Am. Acad. xxii. 67, & Mem. Torr. Club, i. 59. *C. ampullacea*, Good. Trans. Linn. Soc. ii. 207; Eng. Bot. xi. t. 780; Fl. Dan. xiii. t. 2248; Reichenb. Ic. Fl. Germ. viii. t. 277; Carey in Gray, Man. 566; Boott. Ill. iv. t. 501. *C. utriculata*, Boott, var. *minor*, Boott, Ill. i. 14; Bailey, Mem. Torr. Club, i. 60, & in Gray, Man. ed. 6, 594. — Very wet swamps and in shallow water, Newfoundland and Labrador to Connecticut, New York, Illinois, the Saskatchewan and Vancouver, south in the mountains to Utah and California: Europe.

Var. UTRICULATA, Bailey. Coarser; the mature spikes 1 to 2 cm. thick, often longer than in the species: perigynium elliptic-ovate to oblong, 0.5 to 1 cm. long, tapering gradually to the beak. — Proc. Am. Acad. xxii. 67. *C. utriculata*, Boott in Hook. Fl. Bor.-Am. ii. 221, & Ill. i. 14, t. 39; Gray, Man. ed. 5, 600, in part; Bailey in Gray, Man. ed. 6, 594, in part; Britton & Brown, Ill. Fl. i. 297, in part. *C. ampullacea*, Good., var. *utriculata*, Carey in Gray, Man. 566. —Newfoundland to New Jersey, Ohio, and the Saskatchewan; in the Rocky Mountains to Utah, and on the Pacific Slope.

Var. **ambigens**. Very slender, 3 to 5 dm. high, culms barely 1 mm. in diameter below the spikes: leaves 2 to 5 mm. wide: staminate spikes 1 or 2; pistillate 1 to 3, globose or short-oblong, 1 to 2.5 cm. long: perigynium as in the species. — NEW BRUNSWICK, South Tobique Lakes, July 18, 1900 (*G. U. Hay*, no. 41): MAINE, sandy shore of St. John River, St. Francis, June 18, 1898 (*M. L. Fernald*, nos. 2076, 2077). Habitally resembling *C. monile*, but with the stiffer habit, spongy culms smooth and bluntly angled above, the nodulose leaves and the perigynia of *C. rostrata*.

++ ++ Perigynium bladder-like (except in *C. vesicaria*, var. *Raeana*): culm comparatively slender, sharp-angled above, often harsh: leaves slightly or not at all nodulose.

= Beak of the perigynium usually slightly roughened or serrulate (see exceptional specimens of *C. retrorsa*).

C. BULLATA, Schkuhr. Extremely slender, 7 dm. or less high, the long leaves 2 to 4 mm. wide: staminate spikes mostly 2 or 3, long-peduncled; pistillate spike 1 (or if 2, remote), globose or thick-cylindric, 1 to 4 cm. long, 1.5 to 2 cm. thick, rather loosely flowered:

perigynium strongly nerved, firm and shining, orbicular to ovate, very turgid, 6 to 9 mm. long, contracted to a slender conic-cylindric short-toothed beak, spreading and much exceeding the acute or bluntish scale. — Riedgr. Nachtr. 85, t. Uuu. fig. 166; Carey in Gray Man. 566; Boott, Ill. i. 15, t. 41; Bailey, Proc. Am. Acad. xxii. 68. *C. cylindrica*, Schw. acc. to Boott, l. c. *C. Greenii*, Boeckeler, Flora, 1858, 649. — Swales and wet meadows, Southern Maine to Pennsylvania and So. Carolina. Occasionally smooth-beaked specimens occur but these can be distinguished from *C. Tuckermani* by the firm texture of the perigynium and its peculiar yellow-green color.

Var. **Olneyi**. Coarser, the leaves 4 to 6 mm. wide: pistillate spikes mostly 2, cylindric, more densely flowered, 2.5 to 5 cm. long, 1 to 1.5 cm. thick: perigynium duller, more ascending and smaller than in the species. — *C. Olneyi*, Boott, Ill. i. 15, t. 42; Gray, Man. ed. 3, xcvii. *C. bullata* × *utriculata*, Bailey, Proc. Am. Acad. xxii. 68, & in Gray, Man. ed. 6, 595. *C. monile*, Britton, Bull. Torr. Club, xxii. 221, not Tuck. — Massachusetts to Delaware. MASSACHUSETTS, Tophet Swamp, Lexington, (*Wm. Boott*); Southbridge (*R. M. Harper*): RHODE ISLAND, Providence (*S. T. Olney*): DELAWARE, Blackbird and Townsend (*W. M. Canby*).

C. LUPULINA × BULLATA, Fernald. Coarse as in *C. lupulina*: pistillate spikes 3 cm. broad: perigynium firm as in *C. bullata*, but large and dull as in *C. lupulina*. — Rhodora, ii. 170. — MASSACHUSETTS, Medford (*Wm. Boott*).

= = Beak of perigynium smooth (rarely a little serrulate in *C. retrorsa*).

a. Mature perigynium 5 to 6.5 mm. thick.

C. TUCKERMANI, Dewey. Culms slender, 1 m. or less long, forming loose stools: leaves 3 to 5 mm. wide, the bracts very leaf-like and usually much exceeding the culm: staminate spikes 2 or 3, long-peduncled; pistillate 2 or 3, slender-peduncled or the upper sessile, cylindric-oblong, 2 to 6 cm. long, 1.2 to 1.8 cm. thick, loosely flowered: perigynium glossy, extremely membranaceous and bladder-like, strongly nerved, globose-ovate, 1 cm. long, tapering gradually to the slender cylindric beak, much exceeding the oblong-ovate acute or acuminate scale. — Am. Jour. Sci. xlix. 48, fig. 117; Boott, Trans. Linn. Soc. xx. 115, & Ill. i. 15, t. 40; Gray, Man. ed. 5, 601; Bailey, Proc. Am. Acad. l. c. & Mem. Torr. Club, i. 72. *C. bullata*, Dewey, Am. Jour. Sci. ix. 71, not Schkuhr. *C. cylindrica*, Carey in Gray, Man. 566. — Rich alluvium, New Brunswick, Maine, the White Mountains, and the Connecticut Valley to New Jersey, Indiana, Minnesota, Ontario and Lake St. John, Quebec.

b. Mature perigynium not more than 4 mm. thick.

1. Perigynium ascending, straight (*C. retrorsa*, var. *Macounii* may be looked for here).

C. VESICARIA, L. Comparatively slender, 0.4 to 1 m. high, the

culms sharply angled and generally roughish above, usually overtopped by the bracts: leaves 4 to 7 mm. wide, loosely ascending or spreading, but of firm texture: staminate spikes mostly 2 or 3, peduncled; pistillate spikes 2 (rarely 1) or 3, remote, sessile or short-peduncled, cylindric, 2 to 7 cm. long, 1 to 1.5 cm. thick: perigynium slightly turgid, ovate- to oblong-conic, tapering gradually to the slender beak, when mature 7 to 9 mm. long, twice exceeding the ovate-lanceolate acute or acuminate scale. — Sp. 979; Fl. Dan. iv. t. 647; Eng. Bot. xi. t. 779; Reichenb. Ic. Fl. Germ. viii. t. 276; Carey in Gray, Man. 565; Boott, Ill. iv. t. 536. *C. monile*, Dewey, Am. Jour. Sci. xlix. 47, fig. 116; Bailey, Proc. Am. Acad. xxii. 67, & in Gray, Man. ed. 6, 594, in part; not Tuck. *C. sp.* Boott, Ill. i. 28. *C. vesicaria*, var. *cylindrica*, Dewey, l. c. as syn. *C. Vaseyi*, Dewey, l. c. ser. 2, xxix. 347; Gray, Man. ed. 5, 600. — A common Old World species; less common in America. Quebec, Lake St. John (*E. Brainerd*): Maine, Mechanic Falls (*J. A. Allen*): New Hampshire, Franconia (*E. & C. E. Faxon*): Vermont, Middlebury (*E. Brainerd*): Massachusetts, Medford (*Wm. Boott*); Dedham (*Wm. Boott, H. A. Young*): Rhode Island, Seekonk River (*S. T. Olney*): Connecticut, Plainville (*C. Wright*); Southington (*C. H. Bissell*): New York, Pen Yan (*H. P. Sartwell*, exsic. no. 152, etc.): Pennsylvania, Huntingdon Co. (*T. C. Porter*): Ohio (vide Boott, Ill. t. 536): Ontario, Ottawa (*Wm. Scott*); Nipigon River (*J. Macoun*): also in the northwestern states in various forms.[1]

Var. **monile**. Leaves 2 to 5 mm. wide: pistillate spikes similar: the perigynium more turgid, roundish-ovate, about 6 mm. long, rather abruptly tapering to the beak.— *C. monile*, Tuck. Enum. Meth. 20; Carey in Gray, Man. 565: Boott, Ill. i. 28, t. 72; Bailey, Proc. Am. Acad. l. c. & Mem. Torr. Club, i. 39.— Meadows and low ground, Newfoundland to the Saskatchewan, Kentucky and Missouri; also Transylvania at Csik (*Barth*).

Var. **jejuna**. Smaller and more slender; leaves mostly 3 mm. wide: pistillate spikes thinner, 5 to 8 mm. thick: perigynium as in the last, 4 or 5 mm. long.— *C. monile*, var. *minor*, Olney in herb.; Bennett, Pl. Rhode Isl. 50 (as nomen nudum).— Quebec, Lakes Edward and St. John, Aug. 1896 (*E. Brainerd*): New Brunswick, South Tobique Lakes, July 18, 1900 (*G. U. Hay*, no. 57): Maine, St. Francis, June 18, 1898 (*M. L. Fernald*, no. 2075); Madawaska Lake, Aug. 2, 1900 (*E. F. Williams*): New Hampshire, North

[1] Although the West-American forms of the group are not specially discussed in this paper it is worthy of note that Brewer's no. 1654 from the Yosemite Valley is exactly *C. vesicaria*, var. *latifolia*, Blytt, Norg, Fl. i. 252, one of Blytt's original specimens matching the Californian material in every detail. Superficially the plant resembles *C. rostrata*, var. *utriculata*, but it has the sharply angled harsh culm of *C. vesicaria*.

Conway, Aug. 27, 1855 (*Wm. Boott*); Echo Lake, North Conway, June 8, 1878, near Gate of the Notch, July 7, 1878, and between Bethlehem and Fabyans, July 5, 1879 (*E. & C. E. Faxon*): Vermont, Island Pond, July 4, 1854 (*Wm. Boott*); Gardner's Island, Lake Champlain, June 26, 1877 (*C. G. Pringle*); E. Wallingford and Bloomfield, 1899 (*W. W. Eggleston*, nos. 1659, 1667): Massachusetts, Framingham, July 7, 1897 (*E. C. Smith*, no. 653): Rhode Island, banks of Seekonk River, June 15, 24, 1867 (*S. T. Olney*): Connecticut, Hartford, June, 1879 (*C. Wright*): New York, Sand Lake (*C. H. Peck*); Raquette Falls, July 11, 1899 (*Rowlee, Wiegand, & Hastings*): Ontario, Nipigon River, July 22, 1884 (*J. Macoun*).

Var. distenta, Fries. Nearly as slender as the last: pistillate spikes 1 or 2, short and thick, 1 to 2.5 cm. long, 1 to 1.3 cm. thick: perigynium as in var. *monile.*— Herbar. norm. Fasc. 15, no. 84, acc. to Blytt, Norg. Fl. i. 253. *C. Friesii*, Blytt, l. c.— Norway (*Blytt*): Ungava, along Ungava River (*Spreadborough*, Herb. Geol. Surv. Dept. Can. no. 13,647): Newfoundland, Exploits River, with *C. saxatilis*, var. *miliaris* and *C. Grahami*, Aug. 13, 1894 (*Robinson & Schrenk*); Grand Lake (*Waghorne*): Quebec, Rupert River (*J. M. Macoun*, Herb. Geol. Surv. Can. no. 20,241): Maine, outlet of Moosehead Lake (*E. & C. E. Faxon*); Orono (*M. L. Fernald*). Closely resembling *C. Grahami*, but in its acute scale and sharply long-toohed beak clearly an extreme of *C. vesicaria.*

Var. **Raeana.** Very slender, 4 to 6 dm. high: leaves 2 mm. wide, tending to become involute at tip: pistillate spikes very slender, at most 3 or 4 cm. long, 4 to 8 mm. wide: perigynium scarcely at all inflated, oblong-ovate to oblong-lanceolate, tapering gradually to the beak, 4 to 6 mm. long, one-third longer than the acuminate scale.— *C. Raeana*, Boott, in Rich. Arct. Exped. ii. 344, & Ill. i. 25, t. 64; Bailey, Proc. Am. Acad. xxii. 65, in part. *C. monile*, var. *Raeana*, Bailey, Mem. Torr. Club, i. 39.— Athabasca. Methye Portage, Methye Lake [Lac la Loche] (*Sir John Richardson*): Quebec, Roberval, Lake St. John, Aug. 22, 24, 1896 (*Ezra Brainerd*).

2. Perigynium retrorse or wide spreading (ascending in var. *Macounii*), slightly falcate.

C. retrorsa, Schwein. Rather stouter than the last species, 1 m. or less high: leaves ribbon-like, of very soft texture, mostly 0.5 to 1 cm. wide; the bracts very much overtopping the culm: staminate spikes 1 to 4, sessile or short-peduncled, often pistillate at base; pistillate spikes 3 to 8, mostly clustered at the tip, sessile or short-peduncled, spreading, or the lower long-peduncled and remote, frequently compound, 1.5 to 5 cm. long, 1.5 to 2 cm. thick: perigynium very thin and soft, reflexed, conic-ovate, long-beaked, 8 to 10 mm. long, much exceeding the acuminate scale.—Ann. Lyc. N. Y. i. 71; Schw. & Torr. Ann. Lyc. N. Y. i. 366, t. 28, fig. 2; Carey in Gray, Man. 565; Boott, Ill. ii. 93, t. 276; Bailey, Proc. Am. Acad. xxii. 68, &

in Gray. Man. ed. 6, 595. *C. reversa*, Spreng. Syst. iii. 827. — Wet places, Gulf of St. Lawrence to the Saskatchewan and British Columbia, south to Pennsylvania, Michigan, Idaho and Oregon.

Var. HARTII, Gray. Pistillate spikes scattered, long-peduncled: perigynia mostly wide-spreading. — Man. ed. 5, 600; Bailey, Proc. Am. Acad. l. c. *C. Hartii*, & var. *Bradleyi*, Dewey, Am. Jour. Sci. ser. 2, xli. 226. — Rather local, NEW HAMPSHIRE, Jackson (*Wm. Boott*): VERMONT, Pomfret, (*A. P. Morgan*): NEW YORK, Jefferson Co. (*Crawe*); Dundee, Yates Co. (*S. Hart Wright*); Greece (*S. D. Bradley*): ONTARIO, Seymour and Stirling (*J. Macoun*): MICHIGAN, Agricultural College (*C. F. Wheeler*); Lansing (*L. H. Bailey*).

Var. **Macounii**. Similar to the latter, but perigynia ascending. — *C. Macounii*, Dewey, l. c. 228. *C. lupulina*, var. *gigantoidea*, Dewey, l. c. 328. *C. lurida* × *retrorsa*, Bailey, Bot. Gaz. xiii. 88. *C. lupulina* × *retrorsa*, Dudley, Cayuga Fl. 119. — NEW YORK (fide *Dudley*, l. c.): ONTARIO, Seymour, Northumberland Co., July 15, 1865, July 16, 1867, July 15, 1873, and Belleville, July, 1866 (*J. Macoun*): MICHIGAN, Alma, Aug. 20, 1893 (*C. A. Davis*).

C. RETRORSA × UTRICULATA, Fernald. Spikes and perigynia as in *C. rostrata*, var. *utriculata*, but the latter strongly retrorse. — Rhodora, ii. 170. — CONNECTICUT (*C. Wright*).

+ + Scales mostly with thin serrulate awns.

C. LURIDA, Wahl. Culms mostly smooth and obtusely angled, 1 m. or less high: leaves loose, scabrous, broad and flat, 4 to 6 mm. wide; the bracts leaf-like, elongated: staminate spike usually 1, elongated, peduncled or sessile, commonly subtended by a very narrow bract; pistillate spikes 2 or 3 (rarely 4), subapproximate, the upper subsessile, the lower short-peduncled and when more than 2 somewhat remote, very comose, oblong-cylindric, mostly 3 to 6 cm. long, 1.5 to 2 cm. thick: perigynium very thin and bladder-like, about 10-nerved, globose-ovate, 7 to 10 mm. long, the body barely equalling the slender long-conic beak. — König. Acad. Hand. xxiv. 153 (1803), fide Bailey, Mem. Torr. Club, i. 10, 11. *C. tentaculata*, Muhl. in Willd. Spec. iv. 266; Schk. Riedgr. Nachtr. 53, t. Ggg. fig. 130; Carey in Gray, Man. 563; Boott, Ill. ii. 94, t. 277; Bailey, Proc. Am. Acad. xxii. 69. *C. rostrata*, Willd. Spec. iv. 282; Schk. l. c. 54, t. Hhh. fig. 134; not Stokes. *C. tentaculata*, var. *rostrata*, Pursh, Fl. i. 41. *C. gigantea*, Kunth, Enum. ii. 503 (fide Bailey). *C. Purshii*, Olney, Exsicc. fasc. i. no. 30. *C. Beyrichiana*, Boeckel. Linnaea, xli. 239 (fide Bailey). — A very common species in low ground, Annapolis Co., Nova Scotia, and Queens Co., New Brunswick to Ontario, Georgia, Louisiana, and Texas. Passing by numerous transitions to several formal varieties: —

Var. EXUDANS, Bailey. Spikes far apart, the lower very remote on elongated capillary peduncles. — Bailey in Britton & Brown, Ill. Fl. i. 299. — Range of species.

Var. FLACCIDA, Bailey. Spikes rather crowded at the tip of the culm, none remote, usually more ascending and less comose than in the species. — Mem. Torr. Club, i. 73. — Range of species.

Var. PARVULA, Bailey. Most of the spikes subglobose or short-oblong, 1 or 2 cm. long. — Bull. Torr. Club, xx. 418. *C. tentaculata*, var. *parvula*, Paine, Cat. Pl. Oneida, 105. — Range of species.

Var. GRACILIS, Bailey. The most slender form: leaves 2 or 3 mm. wide: spikes as in the species, but more slender, 1 to 4 cm. long, 1 to 1.3 cm. broad: perigynium 5 to 7 mm. long. — Mem. Torr. Club, i. 11, & in Gray, Man. ed. 6, 595. *C. tentaculata*, var. *gracilis*, Boott, Ill. ii. 94; Bailey, Proc. Am. Acad. l. c. *C. Baileyi*, Britton, Bull. Torr. Club, xxii. 220, & in Britton & Brown, l. c. fig. 694. — Mostly in mountainous regions, MAINE, east base of Mt. Katahdin and at Farmington (*M. L. Fernald*): NEW HAMPSHIRE, Franconia (*Wm. Boott*): VERMONT, Lake Dunmore, etc. (*A. W. Chapman*); Willoughby Lake (*Wm. Boott* etc.); Underhill (*G. G. Kennedy*); Smugglers Notch (*Churchill*, etc.); Waterbury and Ripton (*E. Brainerd*); No. Pomfret (*A. P. Morgan*); Townshend (*L. H. Bailey*): PENNSYLVANIA Delaware Water Gap (*Wm. Boott*): reported from the Southern Alleghanies.

C. LURIDA × LUPULINA, Bailey. Spikes subapproximate, 2 to 2.5 cm. broad: perigynium ascending, ovate-conic, about 18-nerved, 1 to 1.2 cm. long.— Mem. Torr. Club, i. 73, & in Gray, Man. ed. 6, 595. *C. tentaculata*, var. *rostrata*, Sartwell, exsicc. no. 138. *C. tentaculata*, ? var. *altior*, Boott, Ill. ii. 94, t. 278. *C. tentaculata* × *lurida*, Bailey, Proc. Am. Acad. l. c. 69, in part.— MASSACHUSETTS, Medford (*Wm. Boott*); Amherst (*E. Tuckerman*): CONNECTICUT, Groton (*C. B. Graves*); Wethersfield (*C. Wright*, acc. to Bailey): NEW YORK, Pen Yan, (*Sartwell*, no. 138). Sartwell's specimens have some good achenes, and the plant, though of hybrid origin, may now be a fertile form.

C. SCHWEINITZII, Dewey, in habit closely approaches slender-spiked forms of *C. rostrata*, and in its scales it is very close to *C. lurida*. Its perigynia are slightly inflated, in this also approaching the *Vesicariae*, but they are strongly costate as in the *Pseudocyperae*, and the plant is best treated, for the present at least, as a transitional species between these two groups.

GRAY HERBARIUM.

RAISING MUSHROOMS IN A CELLAR.

JOSEPH TORREY, JR.

IN 1897 and 1898 I undertook to cultivate mushrooms in my cellar. I had good success; and it has been suggested that my experience may be helpful to others who are desirous of making experiments in this direction.

My first bed was six feet long by four feet wide. The materials used in its construction were two barrels of horse manure, two and one half barrels of fresh loam and three bricks of mushroom spawn. The bed was constructed as follows: The manure, which had been carefully gathered so as to be as free as possible from straw, was spread out in the basement of a barn near by, and allowed to "heat," or ferment. Each day it was turned and left in form of a long "windrow." This was kept up till the man reported that the manure was nearly through heating. It was then brought into the cellar, after having been gone over once more to get out the last pieces of straw, and mixed up carefully with its own bulk of loam, care being taken that no lumps should remain, and that the whole mixture should be smooth and uniform. A layer of this mixture was then laid on the cement floor of the cellar and tramped or beaten into a firm mass about three inches deep. Another layer was now put down and the process continued till the bed was about ten inches deep. After standing for a few hours the bed had, as I found by making a hole down through it, about the same temperature as my hand, and this is about the right temperature for spawning. The second year I had to wait a day before the temperature came down to this point, but I am sure I could manage, with my past experience, to judge the condition of the manure in the windrow so that when it was put in the bed it would be ready to spawn at once, and I think anyone could. To spawn the bed, the spawn was cut into pieces about the size of a small egg, and each piece was put into a hole about four inches deep, and carefully covered with the manure-loam mixture. The holes were about eight inches apart as nearly as I can remember, at all events there were about sixty holes. I left the bed in this condition over night. The next day I put on four inches of loam and beat it down into a fairly compact form — not nearly so compact, however, as the underpart of the bed.

This was all the attention I gave it, except that once in a while during the next six weeks I moistened the surface with water at about the temperature of my hand, using a watering pot, and trying to use about as much water as would fall on that amount of surface in a moderate summer shower. I cannot say how many times this was done for I kept no notes, but not more than three or four at the most.

Mushrooms appeared in about six and a half weeks and the bed continued to bear for about four weeks. At the end of that time I put on four inches more loam, when the bed started up again and bore for about a fortnight longer.

I cannot give any figures as to the quantity of mushrooms gathered. It may seem strange that no notes were kept, but the fact is I did not enter upon the undertaking in any scientific way, and was not disposed to give much care or thought to it; but I thought it would be worth while to see whether the cultivation of mushrooms in a cellar was a difficult or an easy process. If it had proved difficult I should have dropped it at once. All I can say, then, is that there were mushrooms every day and sometimes they were gathered three times a day. They were large, fleshy, and of good flavor. No trace of any other kind of fungus appeared from first to last.

As to the difficulty, I never encountered it. Of course it may be I was especially favored by good fortune, but the fact that the same processes repeated the next year yielded practically identical results seem to show that there is no difficulty about it, at least on a small scale. It is more than probable that when carried on continuously and on the large scale complications would arise, and I should hesitate myself to undertake it without much more careful study than I have ever given to the subject.

The question is often raised whether the odor from the bed is noticeable. In my experiments there was no odor whatever from first to last. None could be detected even at the surface of the finished bed except the odor of mushrooms after the bed began bearing.

Cambridge, Massachusetts.

The yellow-fruited form of Ilex opaca at New Bedford, Massachusetts.— Attention was called in Rhodora of December, 1900, to a new station for the rare yellow-fruited *Ilex verticillata*, Gray. During the recent holiday season a collector of evergreens

for decorative purposes brought to New Bedford a few branches of a yellow-fruited Holly, *Ilex opaca*, Ait. The fact was called to my notice, when I immediately sought out the farmer who had found the tree and engaged him to pilot me to the spot. It was not an easy task to find it in the deep woods of oak and pine with snow lying on the ground, but persistent effort at last revealed the object of our search. It was a slender, symmetrical tree, 18 to 20 feet in height, with the trunk five inches in diameter at the ground. The abundant clusters of berries were looser, and the bright, yellow fruit somewhat smaller than the typical form.

The "Illustrated Flora" mentions the variety as rarely occurring, and it is quite remarkable that the two rare varieties of the same genus should be found but a few miles apart. — E. Williams Hervey, New Bedford, Massachusetts.

A NEW VARIETY OF JUNCUS TENUIS.

M. L. Fernald.

(Plate 23.)

During the past July Mr. Emile F. Williams found at Van Buren, Aroostook County, Maine, a singular rush, unlike any of the forms recognized in America. In the light of Dr. Wiegand's excellent paper [1] and the authenticated specimens in the Gray Herbarium and the herbarium of the New England Botanical Club, Mr. Williams's plant is confidently placed with *Juncus tenuis*. In its loose broad sheaths with prolonged white scarious auricles and in its greenish flowers it is clearly a form of this species, but in its inflorescence it is very unlike any described variety.

The short conspicuously secund branches of the inflorescence suggest at first *J. secundus*, Beauv., but in that the branches of the inflorescence are very ascending or even incurved, and the bract is distinctly shorter. In Mr. Williams's plant, on the other hand, the very short branches are widespreading or recurved and much exceeded by the bracts. In the secund arrangement of its flowers the plant approaches also Dr. Wiegand's *Juncus tenuis*, var. *anthelatus*;

[1] Juncus tenuis Willd. and some of its North American Allies; Bull. Torr. Club, xxvii. 511–527.

but that is a coarser form with very large loose inflorescences and scattered flowers, while the Van Buren plant is low and slender with small inflorescences of closely approximate flowers.

The plant, here proposed as a new variety and dedicated to Mr. Williams who was first to call attention to its peculiar habit, is not confined to the St. John valley, as identical specimens were collected at Edgeworth, Malden, Massachusetts, by the late Wm. Boott in 1853. Its characters, clearly shown in the plate generously prepared by Mr. Charles E. Faxon, are here briefly summarized:

JUNCUS TENUIS, Willd., var. **Williamsii**. Very slender, 2 to 4 dm. high: bracts mostly 2 or 3, at least one overtopping the narrow oblong (2.5 to 8 cm. long) inflorescence: branches mostly widespreading or slightly recurved, 1 to 2 cm. long, closely 3–6-flowered, strongly secund: mature capsule equalling the perianth.— MAINE, Van Buren, July 19, 1900 (*Emile F. Williams*): MASSACHUSETTS, Edgworth, Malden, July 19, 1853 (*Wm. Boott*, in Herb. N. E. Bot. Club).

EXPLANATION OF PLATE 23.—*Juncus tenuis* var. *Williamsii*: fig. 1, portion of an original specimen from Van Buren; fig. 2, mature capsule, enlarged; fig. 3, sheath with prolonged scarious auricle, enlarged. *J. tenuis*: fig. 4, inflorescence of a plant from New Haven, Connecticut. *J. tenuis*, var. *anthelatus*: fig. 5, inflorescence of an original specimen from Hartford, Maine.

A COLONY OF WAIFS OF THE HELIANTHOIDEAE.— In 1896 I discovered in an old field in Oxford, Connecticut, *Helianthus rigidus*, Desf., and *H. grosse-serratus*, Martens. In 1897 or 1898 I found *Heliopsis scabra*, Dunal, close at hand, and as I passed through the field in August of this year my eye was caught by an unfamiliar flower, which proved to be *Lepachys pinnata*, Torr. & Gray. The field was under cultivation some eight or ten years ago, and has since been used mostly as a pasture. Seeds of these western species were doubtless brought here with grain, but it seems remarkable to find a group of four so nearly related plants so far from their range and persisting through so long a time. Of the four *Helianthus rigidus* seems most at home, although the most western in its natural range. It grows over an area of nearly half an acre in several patches and seems to be increasing from year to year. *H. grosse-serratus* grows mixed with the last in four small patches and seems to be decreasing, as is also *Heliopsis scabra*, of which there are not more than a dozen plants. Of the *Lepachys* I have seen but a single clump of ten flowering stalks.— E. B. HARGER, Oxford, Connecticut.

NOTES ON THE EMBRYOLOGY OF SOME NEW ENGLAND ORCHIDS.

R. G. Leavitt.

Spiranthes cernua. — In the December Rhodora I gave a brief account of polyembryony in this species. The embryos (Fig. 1) are of vegetative origin and ecologically are to be classed with bulbils and tubers. It is noteworthy that the apparatus of fruit and seed-coats, which serves most plants for the dissemination of embryos sexually derived, is here put to the same use in the interests of the apogamous off-spring. The plant combines in this process the swiftness of seed-dispersal with the elsewhere slow, but always sure, methods of vegetative propagation.

Fig. 1

Heretofore *Coeleboyyne ilicifolia* alone has been known to produce adventive embryos without the stimulus of pollination. With *Spiranthes cernua*, therefore, I took pains to determine whether pollen was needed to make the embryos grow. I took up a plant, which had lately sent up a flower-spike, on which only the six lower flowers were open. From these I drew out the pollinia. The remaining eight flowers were opened and their pollinia were removed with forceps; the pollinia in every case were examined under a lens and found to be whole. In several cases the membranes surrounding the pollen-masses were brought away with the pollen. The potted plant was then placed under a bell-jar in the laboratory, where it was kept until the seeds were ripe; with the result, as already reported, that multiple embryos formed as abundantly and grew to the same dimensions in all the pods as they do upon plants in the fields.

Among orchids polyembryony of this type is known only in this species, I believe. Below will be noted instances in other New England species of the doubling of the embryo in the embryo-sac in the manner already described for several orchidaceous plants.

When the sac and egg-apparatus develop normally, and the egg undergoes fertilization — a condition that I found in a few plants of this species — the resulting embryo within a very few days becomes

large enough to fill the sac. On all sides the tissues are then pushed back. Below — or towards the exostome of the seed — the end of the embryo, where the suspensor should be found, is rounded and is covered only by the remains of the enveloping cells (Fig. 2). At the opposite extremity a recession of the sac is filled with dense protoplasm in which a large and perfect nucleus (*en*) is always present.

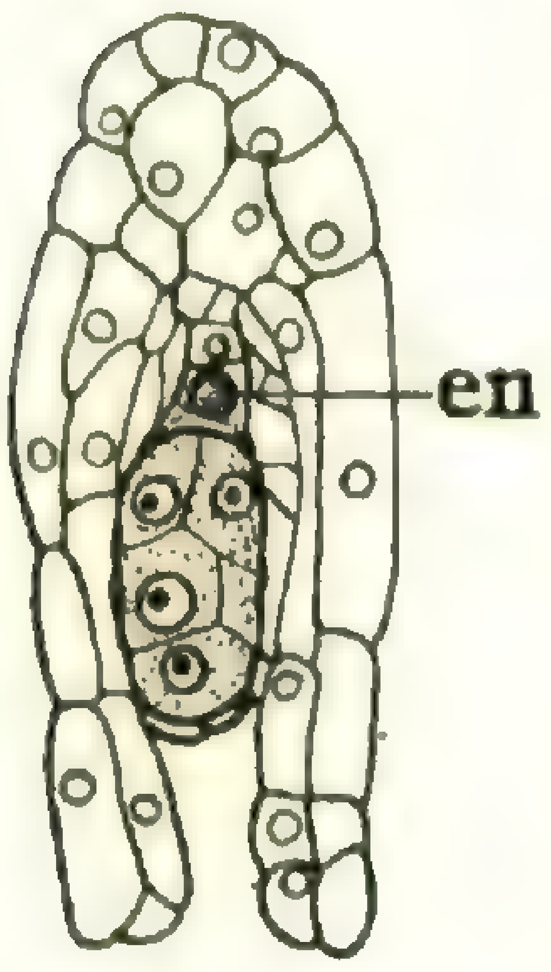

Fig. 2

The question of the origin of this nucleus is of great interest just at the present time. For those who have not freshly in mind the history of the various nuclei of the embryo-sac of angiosperms, it should be said that at a certain stage four nuclei are found at either end of the sac. One nucleus from each of these groups then advances to the centre of the sac. These are termed polar nuclei. They ultimately fuse and the resulting body is the so-called endosperm nucleus, ordinarily to be distinguished by its size and position. The three nuclei remaining at the base of the sac are the antipodals. One of the three at the micropilar end becomes the egg-nucleus; the other two are the nuclei of the synergides. After the inception of the embryo, in most plants the endosperm nucleus divides repeatedly, giving rise to the cells of the endosperm the function of which is to nourish the embryo.

Recently Nawaschin, followed by other observers, has discovered that in some plants at least, one of the male nuclei from the pollen tube takes part with the polars in the formation of the endosperm nucleus. Both male generative cells are thus functional, one combining with the egg, one with the polars. Nawaschin calls this *double fertilization*. The discovery is regarded as one of the most interesting of recent years.

In following the fertilization of some tropical orchids Nawaschin has come to the conclusion that there is no fusion of polars and male; that though the three come to lie in a close group, no actual union occurs. This appears to Nawaschin to explain the absence of endosperm in Orchidaceae.

Strasburger long ago described the nuclear changes in the embryo-sac of several native orchids, and specifically affirmed the fusion of the polars. Now he has reëxamined his material and concludes that the extra spermatic nucleus takes part with the

polars in the production of a true endosperm nucleus. In the orchids which he has investigated, therefore, lack of endosperm cannot be charged to the failure of double fertilization.

In normally fertilized *Spiranthes cernua*, after fertilization, a well-formed nucleus of at least twice the size of a single antipodal is to be seen near the middle of the sac. It is this which is pushed to the base of the sac by the growth of the embryo.

In one of my preparations (by paraffine) may be seen a sac containing a very young embryo, the synergides near by, the antipodals in their places, and toward the centre of the sac two nuclei about the size of the antipodals, lying in contact, while between and touching both is a much smaller, deeply staining nucleus presenting the usual appearance of the spermatic nuclei of orchids. Here we have the origin of the large central nucleus clearly indicated.

These facts lead me to suppose that in *Spiranthes cernua* polar fusion and double fertilization give rise to a true endosperm nucleus. Nevertheless, no endosperm in formed. The nucleus remains at the end of the sac where probably, by vitalizing the protoplasm around it, it assists in passing along nutriment to the embryo.

(*To be continued.*)

The Ames Botanical Laboratory,
North Easton, Massachusetts.

NOTEWORTHY PLANTS OF SOUTHEASTERN CONNECTICUT,— II.

C. B. Graves.

To the observations reported in a former paper (Rhodora, i, 67) the following may be added as a further contribution to our knowledge of the plant life along the southern borders of New England.

Panicum Atlanticum Nash — Franklin, Old Lyme.

Panicum Bicknellii Nash — Lamb's Hill in Norwich.

Panicum Addisonii Nash — Sandy terrace near Pachaug Pond in Griswold.

Panicum Eatoni Nash — Borders of ponds and marshes both fresh and brackish.

Eleocharis diandra Chas. Wright — Shores of Connecticut River and

of Selden's Cove in Lyme. Originally collected near Hartford, this species has subsequently been found (in one of its forms) along the Connecticut at stations in Massachusetts, New Hampshire and Vermont (see Rhodora, ii, 60). This new station thus extends its known range in New England quite to the mouth of the Connecticut River.

Scirpus Torreyi Olney — with the preceding growing abundantly; in good condition by July 10. Probably its first record in the state.

Carex tetanica Schk. — One station in Waterford. This rare species, otherwise known in New England only from northern Maine and from Berkshire County, Massachusetts, is to be expected in western Connecticut.

Carex ptychocarpa Steud.— With the last. A southern species known from only two more northern stations, one in Rhode Island, the other in Purgatory Swamp, Norwood, Massachusetts.

Sagittaria subulata (L.) Buchenau — Shore of Selden's Cove in Lyme; first reported from this station many years ago by Miss Thompson of East Haddam. This is apparently the only known station in New England.

Sagittaria heterophylla Pursh.— Shores of Connecticut River and Selden's Cove in Lyme; also in Norwich (Setchell).

Sagittaria Engelmanniana J. G. Smith — Waterford, in peat bogs. Not previously recorded from Connecticut, although known from Long Island and from Cape Cod.

Commelina communis L. — Occasionally seen in gutters and waste places, New London.

Rumex altissimus Wood — One plant in waste ground, New London; has been observed now for three seasons.

Rumex Patientia L.— A few plants near Selden's Cove in Lyme. This and the preceding species are apparently seldom seen in Connecticut.

Prunus Alleghaniensis Porter.— Specimens of a plum which Mr. Fernald has identified as this species were collected by the writer in 1898 and 1899 in Lisbon, where it was found growing sparingly on sandy bottoms along the Quinebaug River. This species has been known hitherto only from central Pennsylvania.

Linum medium (Planch.) Britton — Sandy roadsides, Waterford and Old Lyme. This would seem to be one of those plant forms which are more easily distinguished in the field than in the herba-

rium. As seen by me the expanded flowers are distinctly larger and paler than those of *L. Virginianum* L.

Vaccinium Pennsylvanicum angustifolium (Ait.) A. Gray — A small patch of this northern form was found in 1899 near the edge of Great Cedar Swamp, Voluntown. In New England ordinarily confined to the higher mountain summits.

Lonicera coerulea L.— Abundant in Voluntown, especially in the wet sphagnous meadows bordering the cedar swamps. It here fruits very freely, the delicious berries which much resemble blueberries in flavor being fully ripe and loading the bushes on June 17, 1899.

Rhamnus cathartica L.— Lebanon, a few plants by roadsides.

Ilex laevigata Gray — Cedar swamps in Ledyard, North Stonington and Voluntown.

Barbarea praecox R.Br.—Cultivated ground at Scotch Cap, Waterford, 1899 and 1900. Apparently its first record in New England.

Silene dichotoma Ehrh.—Waste ground, New London, 1898.

Cerastium semidecandrum L.— Abundant in old fields near Niantic River, East Lyme. Formerly unknown north of New Jersey.

Spiraea ulmifolia Scop.— Sparingly escaped to a roadside thicket near Cedar Grove Cemetery, New London.

Aster Schreberi Nees — Wooded banks, Montville and Norwich.

Chrysanthemum Balsamita L. — Escaped to the roadside near farm houses at two places in East Lyme and one in Groton. One of these stations was discovered about ten years ago, and the plant was then well established. A resident of one of these houses when asked the name of this plant called it "beaver's tongue."

New London, Conn.

The Sixth Annual Winter Meeting of the Vermont Botanical Club was held at the University of Vermont on the 25th and 26th of January. Fourteen papers were presented. Among the more important of which was that of President Brainerd, entitled: The present Status of Vermont Botany. It was an able discussion of the flora as presented in the new catalogue of Vermont plants. In outlining the work of the Club in the future, he maintained that plants in the field in their ecological and physiological relations should receive more attention. Much interest was manifested in the account of the finding of a plumose variety of *Asplenium ebeneum* Ait. by Mrs. Frances B. Horton of Brattleboro. Dr. E. A. Burt gave a detailed description of *Tremella mycetophila* Pk. and stated his reasons for transferring it to *Exobasidium mycetophilum* (Pk.) Burt.

Prof. L. R. Jones discussed the poisonous properties of the equisetums and ferns. Although they were undoubted cases of horses being poisoned by Equisetum, the evidence showed the ferns free from any such stigma. The minor discussions centered about the new catalogue and were of unusual interest. The midsummer field meeting is to be held in Rutland on the 2nd and 3d of July.—C. D. Howe, Univ. of Vermont.

In The Foundations of Botany[1] Mr. Bergen follows in the main the plan of his earlier text-book, which the present attractive volume replaces. The amount of subject-matter is increased by new experiments and observational work, and new chapters on Ecology and on Types of Cryptogams (the latter by Mr. A. B. Seymour). With a new Key and Flora, describing nearly 700 species of common spring plants, the whole matter covers some 670 pages.

Improvements in the teaching directions and many new and interesting exercises show the author's gain in the technique of botanical teaching in the years since the former book appeared. The new sections are particularly good reading, and the text as a whole has gained in vivacity and the interest due to breadth of view combined with concrete treatment. The illustrations, while not entirely original, are well selected and well executed. Mr. Bergen has given the schools a most serviceable text-book.

In case the school authorities allot but a half year to botany the good sense of the teacher (and school committee) should safeguard the pupil from the only danger which besets him in the case of a book so attractive — the danger of being hurried through a great number of observations without time for proper comprehension.— L.

As it is now customary in binding scientific periodicals to include the covers, thus making them a permanent part of the volume, we shall be glad to furnish a correctly centered cover to replace that of our February issue which was by accident badly trimmed.

[1] Ginn & Co., Boston, 1901.

Vol. 3, No. 26, including pages 19 to 40, was issued February 1, 1901.

C. E. Faxon del.

JUNCUS TENUIS, var. WILLIAMSII, n. var.

Rhodora

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THE HERBARIA OF NEW ENGLAND.

MARY A. DAY.

WITH the increasing interest in our local flora and its investigation so much stimulated of late by activities of the New England Botanical Club, frequent questions have arisen concerning the exact position, extent, and accessibility of the historic herbaria in this region. Many of these, as the repositories of specific and varietal types, and as the basis of published papers, have, of course, a considerable importance in the scientific investigation of our flora. It is, however, surprisingly difficult to locate the herbaria of some of those collectors whose names and work are familiar to every serious student of New England botany. This is especially true of the amateur collections, for these, at the death of the owner, often change hands several times, remaining intact or being variously divided, before they are finally incorporated in the larger herbaria of some public museum or educational institution. At the suggestion of several New England systematists the writer began more than a year ago to collect for publication in RHODORA data regarding New England herbaria. The work involved a rather extensive correspondence and as it progressed materially increased in interest. Every effort has been made to render the following accounts accurate in details and to this end information has been derived so far as possible from official sources, that is, from the owners or those in charge of the different herbaria. To these persons the author is much indebted for their uniform kindness in replying to inquiries. Absolute completeness however, can hardly be attained in any such presentation and it need scarcely be said that supplementary information will be gladly received.

Many of the herbaria here mentioned are private collections, not open to consultation except through the courtesy of their owners,— a quality of which, happily, there is likely to be no lack where earnest scientific work is concerned.

For ready reference the herbaria are here arranged alphabetically.

Alstead School of Natural History, Alstead, New Hampshire. — Two years ago the Alstead School started a collection of the plants growing within a radius of fifteen miles from Alstead Centre. This tract includes portions of Cheshire and Sullivan Counties, New Hampshire, as well as Windham and Windsor Counties, Vermont. The specimens which are mostly mounted and organized represent chiefly the phaenogams, pteridophytes, and fleshy fungi. The herbarium is accessible only during the session of the School, which occurs in midsummer. The plants are in charge of Messrs. M. L. Fernald and Hollis Webster of Cambridge, Massachusetts. Most of the flowering plants and ferns are exactly duplicated in the herbarium of the New England Botanical Club, and many of the fungi in the collection of the Boston Mycological Club.

Ames, Oakes, North Easton, Massachusetts. — The most important part of Mr. Ames's herbarium consists of the collection of orchids of the world which he commenced in 1899, and which now numbers about 1300 sheets. He also has a collection of the garden hybrids of orchids in which the genus *Cypripedium* alone includes about 400 sheets containing many very valuable specimens. In 1893 Mr. Ames began a collection of the plants of North Easton, Massachusetts, which has increased to 600 specimens, collected chiefly by himself.

Amherst College, Amherst, Massachusetts. — The Amherst College herbarium contains about 12000 sheets of which some 2000 sheets represent European species and the remaining 10000 American; the latter exhibiting chiefly the flowering plants from that part of the United States east of the Mississippi River. Dr. Edward Hitchcock's collection containing plants of local interest, many of which are no longer found growing in the vicinity, is a part of this herbarium. This collection is in charge of Professor J. M. Tyler.

Andrews, Luman, Southington, Connecticut. — About fifteen years ago Mr. Andrews commenced his collection of plants and

since that time he has accumulated about 2400 sheets of specimens of flowering plants and higher cryptogams, of which a small part are European and the rest from the United States. Mr. Andrews has collected extensively in Southington and its vicinity, and from an area of 36 square miles has 1050 species. His list of plants growing upon the summit of Meriden Mountain is based on specimens in his herbarium.

Arnold Arboretum, see Harvard University.

Bailey, William Whitman, Providence, Rhode Island. — Professor Bailey's private collection numbers about 3000 sheets of which nearly half are unmounted. It is arranged by orders according to Bentham & Hooker's Genera Plantarum but the genera under each order are alphabetical. It contains valuable specimens from Stephen Thayer Olney, George Thurber, George Hunt, etc., and is especially strong in *Umbelliferae*, *Compositae*, *Labiatae*, *Carex* and *Filices.*

Barratt, Joseph, see Wesleyan University.

Bates College, Lewiston, Maine. — The nucleus of this herbarium was gathered many years ago by the late Dr. Aaron Young, who was an enthusiastic botanist connected with one of the early geological surveys of Maine. After the death of President Chadbourne of Williams College his herbarium was purchased and presented to Bates College by a patron of the institution. The Chadbourne herbarium contains not only his own collections but Asa Gray's North American *Gramineae* and *Cyperaceae*, Charles Wright's Cuban plants, Chester Dewey's *Carices*, Hall & Harbour's plants of the Rocky Mountains, together with many of C. C. Parry's plants and of Ravenel's Carolina *Fungi.* O. R. Willis's New Jersey plants are also at Bates College. Mr. Fred. E. Pomeroy now has charge of this herbarium.

Bennett, James Lawrence, see Brown University.

Bishop, James Nathaniel, Plainville, Connecticut.—About 1870 Mr. Bishop began his collection of plants and has added to it year by year until he now has between 5000 and 6000 specimens. Besides those of his own preparation he has specimens collected by Dr. J. W. Robbins, Dr. H. C. Bennett, and A. H. Curtiss of Florida; *Potamogetons* from Dr. Morong and *Cyperaceae* and *Gramineae* from Elihu Hall. The New England ferns are well represented. The specialty of his herbarium is the representation of the plants of

Connecticut which forms in great part the basis of his catologues of the state flora.

Bissell, Charles Humphrey, Southington, Connecticut. — Mr. Bissell's herbarium, collected during the last ten years, consists of about 6000 specimens of phaenogams and ferns, the larger part being from New England. The flora of Connecticut is very fully represented and an effort has been made to show the distribution of the plants in the state. It is especially strong in the *Labiatae* and *Cyperaceae*.

Blake, Joseph, see University of Maine.

Bolles, William P., see Massachusetts College of Pharmacy.

Boott, William, see Harvard University, Gray Herbarium.

Boston Mycological Club, Mr. Hollis Webster, Corresponding Secretary, Cambridge, Mass.—This Club was organized in 1895 and soon began a collection, but for two years little was accomplished. During the last three years, however, large additions have been made by active members of the Club and these increase more rapidly than, with the present resources, they can be organized. The botanical range of the herbarium is at present nearly confined to the *Hymenomycetes*, *Gastromycetes*, and *Discomycetes*. It is the intention of the Club to make its collection represent the fungus-flora of all New England so far as the groups above mentioned are concerned. At present, however, the collections are chiefly from eastern Massachusetts. The herbarium is now located in the rooms of the Cambridge Botanical Supply Company, 1286 Massachusetts Avenue, Cambridge, Mass.

Boston Society of Natural History, Boston, Massachusetts.— The herbarium of this Society is in charge of Miss M. E. Carter, Curator. In the general collection of plants are about 40000 specimens of both phaenogams and cryptogams from all parts of the world. The herbarium of Benjamin D. Greene formed the nucleus; among other collections here are Texano-Mexican plants of Charles Wright (collections of 1849, 1852) and of Ferdinand Lindheimer; A. Fendler's plants of New Mexico and Venezuela; Charles W. Short's plants of Kentucky; H. N. Bolander's Californian plants; an admirable suite of the plants secured on the Sir John Franklin Arctic Expedition; also miscellaneous plants from H. P. Sartwell, John Carey, A. W. Chapman and Chester Dewey. The New England herbarium contains about 7000 sheets of both

phaenogams and cryptogams, including the fullest set of William Oakes' plants which were distributed after his death. The Lowell herbarium, given to the Society by John Amory Lowell, numbers about 18000 sheets, among which are the following collections: Mary Wight's Algae and the invaluable Thomas Taylor and C. J. Sprague collections of lichens, as well as some of W. S. Sullivant's mosses. The Lowell herbarium is preserved intact and is still arranged according to the system of Endlicher's Genera Plantarum.

Bowdoin College, Brunswick, Maine. — The herbarium of Bowdoin College, now in charge of Professor L. A. Lee, is inaccessible for reference, being mostly unmounted and without special arrangement. It contains many specimens of plants collected by Rev. Joseph Blake, but the most important portion of the herbarium is probably the plants collected on the early surveys of Maine.

Brace, John Pierce, see Williams College.

NOTES ON A COLLECTION OF CRATAEGUS MADE IN THE PROVINCE OF QUEBEC NEAR MONTREAL.

C. S. Sargent.

The following notes are based on collections made by Mr. J. G. Jack, principally in 1899 and 1900, in the neighborhood of the Lachine Rapids of the St. Lawrence River. The region which has been particularly examined by Mr. Jack is on both banks of the Rapids, and south of the River extends from a point just below them up the River for a distance of fifteen miles and back from the River for about ten miles. The country is here broken into rough rocky limestone ridges, which have been principally cleared of their original forests and are now largely covered with thickets of Thorns, Wild Apples, Plums and Wild Cherries. In addition to the following species, which can be distinguished in Mr. Jack's collections, are probably a number of others in the group of the *Tenuifoliae*. These, however, cannot be satisfactorily characterized until the plants can be more fully studied in the field than has been possible up to this time.

Crus-galli.

Crataegus Crus-galli, Linnaeus, Chateaugay, *J. G. Jack*, August, 1892, May and August, 1899.

Punctatae.

Crataegus punctata, Jacquin, Province of Quebec, *J. G. Jack*, Sept. 1887, St. Helen's Isle, opposite Montreal, August, 1892, Levis, Sept. 1900, Montmorency Falls, August 1895.

Crataegus suborbiculata. Glabrous with the exception of a few short caducous hairs near the base of the upper surface of the pale yellow-green unfolding leaves and below in the axils of their veins. Leaves semiorbicular, particularly on leading shoots, to oval or rarely oblong, short-pointed at the apex, rounded and more or less decurrent at the base on the slender grooved slightly glandular petioles, mostly slightly divided above the middle into three or four pairs of short acute lobes, doubly and sharply glandular-serrate except toward the base, thin and firm in texture, dark dull green above, paler below, about 1½ in. long and broad, or on leading shoots occasionally twice as large, the slender midribs and remote primary veins deeply impressed above; petioles from ⅝ to 1 in. in length; stipules linear-lanceolate, coarsely glandular-serrate, ⅓ to ½ in. long. Flowers ¾ in. in diameter on short stout pedicels in compact compound 6–12-flowered thin-branched cymes; bracts and bractlets linear, finely glandular-serrate, caducous; calyx-tube broadly obconic, the lobes lanceolate, acuminate, entire or occasionally obscurely denticulate, reflexed after anthesis; stamens 20; filaments stout, elongated; anthers small, rose-colored, fading dark purple; styles 5, surrounded at the base by a broad ring of hoary tomentum. Fruit in few-fruited erect clusters on short rigid peduncles, subglobose but often rather longer than broad, ⅝ in. in diameter, dull red, more or less blotched with green and often entirely green on one face; calyx enlarged, persistent, with a broad, deep cavity, the lobes linear-lanceolate, abruptly narrowed from broad bases, dark red on the upper side, nearly entire, wide-spreading and often closely appressed, usually persistent; flesh yellow, thin, dry and hard; nutlets 5, broad and thick, slightly and irregularly grooved on the back, about ¼ in. long.

A tree rarely more than 15 or 16 feet in height with a well developed trunk 6 or 8 in. in diameter covered with pale gray scaly bark, stout wide-spreading branches forming a low flat-topped head, and stout slightly zigzag branchlets marked by small lenticels, lustrous and bright orange-brown for one or two seasons, finally dull ashy gray, and armed with straight slender chestnut-brown lustrous spines from 1 to 2 in. in length.

Flowers during the first week in June. Fruit ripens after the first of October, and falls without becoming mellow.

Low rocky limestone ridges, *J. G. Jack*, Caughnawaga, August 29, 1899, May and September, 1900, Rockfield, May and September, 1900.

Molles.

Crataegus Canadensis. Leaves ovate, short-pointed broadly cuneate, or on leading shoots truncate at the base, slightly lobed usually only above the middle with short broad acute lobes, coarsely and frequently doubly serrate often to the base with spreading glandular teeth; in early spring coated above with soft white hairs and below with dense hoary tomentum; at maturity thin and firm, blue-green, glabrous or scabrate on the upper surface, paler and pubescent on the lower surface particularly along the slender midribs and thin nearly straight primary veins running to the points of the lobes, 2 to 2½ in. long, 1½ to nearly 3 in. wide; petioles slender, often slightly winged above, deeply grooved, conspicuously glandular with stipitate dark glands, tomentose or finally nearly glabrous, from ¾ to 1 in. in length; stipules linear, minutely glandular-serrate, from ½ to ¾ in. long, caducous. Flowers ¾ in. in diameter, in broad loose compound thin-branched tomentose many-flowered cymes; bracts and bractlets linear-lanceolate, glandular-serrate, dark red in fading; calyx-tube broadly obconic, villose with long matted white hairs, the lobes lanceolate, acuminate, glandular with large red stipitate glands, villose on both surfaces, reflexed after anthesis; stamens 20; filaments slender; anthers small, nearly white; styles 5, surrounded at the base by a thin ring of pale tomentum. Fruit in erect thick-stemmed slightly villose clusters, short-oblong to subglóbose, crimson, lustrous, marked by large pale lenticels, slightly villose at the ends, from ⅓ to ½ in. long, about ⅓ in. thick; calyx-tube prominent with a broad, deep cavity, the lobes gradually narrowed from their broad bases, glandular, villose, spreading and reflexed, or often deciduous before the ripening of the fruit; flesh yellow, thin, dry and mealy; nutlets 5, thin, irregularly ridged on the back, about ¼ in. long.

A tree 18 to 20 feet in height with a trunk 6 or 8 in. in diameter, spreading branches forming a broad round-topped head and zigzag branchlets marked by large oblong pale lenticels, dark green and coated when they first appear with matted white hairs, becoming light orange-brown and very lustrous during their first season and ashy gray in their third year, and armed with stout straight or slightly curved lustrous chestnut-brown spines from 2 to 2½ in. long.

Flowers at the end of May. Fruit ripens after the first of October.

Rocky limestone ridges, *J. G. Jack*, Chateaugay and Caughnawaga, October, 1899, May and September, 1900.

In its 20 stamens *Crataegus Canadensis* resembles *C. mollis*, Scheele, of the Mississippi valley and the type of the group. It differs from it in the color of the branchlets, in the smaller flowers, in the much smaller late-ripening fruit, and in the shape, size and texture of the leaves. The other species of this group which have been found in the Province of Quebec and the Atlantic States have 10 never 20, stamens.

Crataegus Champlainensis, Sargent (Rhodora, iii. 20), *J. G. Jack*, Chateaugay, August, 1899, September, 1900, Adirondack Junction, October, 1899, May and September, 1900.

Crataegus submollis, Sargent (Bot. Gazette, xxxi. 7), Province of Quebec, *J. G. Jack*, Chateaugay, May and August, 1899, Rockfield, May, 1900, Caughnawaga, May and September, 1900, Montmorency Falls, September, 1900.

Crataegus anomala. Leaves ovate, acute, divided above the middle into 5 or 6 pairs of short acute or acuminate lobes, coarsely doubly serrate with spreading gland-tipped teeth except at the broadly cuneate or occasionally rounded base; as they unfold conspicuously plicate, scabrate above with short appressed white hairs, villose below particularly on the slender midribs and thin primary veins arching to the points of the lobes and only slightly impressed above, and at maturity membranaceous, yellow-green and glabrous on the upper surface, paler and villose below, 2½ to 3 in. long, 2 to 3 in. wide; petioles stout, slightly grooved and glandular on the upper side with scattered dark glands, ¾ to 1 in. long; stipules linear-lanceolate, or on vigorous shoots falcate and very oblique at the base, conspicuously glandular-serrate, often ½ in. in length. Flowers ½ in. in diameter on elongated slender pedicels, in broad loose compound 10–12-flowered thin-branched villose cymes; bracts and bractlets lanceolate to oblanceolate, finely glandular-serrate; calyx-tube narrowly obconic, densely villose with long matted pale hairs, the lobes lanceolate, acuminate, coarsely glandular-serrate, pubescent on the lower surface; stamens usually 10, occasionally 7 or 8; filaments slender; anthers large, rose-color or red; styles 4 or 5, surrounded at the base by a thin ring of pale tomentum. Fruit pendant in loose slightly villose clusters, obovate to oblong, gradually narrowed to the rounded base, crimson, lustrous, marked by large pale scattered lenticels, slightly villose toward the full and rounded apex, from ⅝ to ¾ in. long, ½ in. thick; calyx large and prominent, with a broad and shallow cavity, the lobes elongated, lanceolate, abruptly narrowed from broad bases, dark red on the upper side, tomentose, finely glandular-serrate, spreading and closely appressed, often deciduous before the ripening of the fruit; flesh light yellow, thin, rather juicy; nutlets 4 or 5, thin, prominently and irregularly ridged on the back, ¼ to $\frac{5}{16}$ in. in length.

A bushy intricately branched tree from 15 to 18 feet in height with a short trunk 6 in. in diameter and slender slightly zigzag branchlets marked by numerous oblong pale lenticels, dark green and villose when they first appear, bright red or orange-brown and lustrous during their second season, orange-brown during their third year, and armed with slender straight or slightly curved spines rarely more than 1¼ in. in length.

Flowers during the last week of May. Fruit ripens after the first of October.

Low limestone rocky ridges near the banks of the St. Lawrence River in the Caughnawaga Indian Reservation, opposite Lachine, *J. G. Jack*, May and September, 1900.

From all other species of the *Mollis* group *Crataegus anomala* may be distinguished by the rose-colored or red anthers, the other species having, so far as they have been observed, light yellow or nearly white anthers.

Flabellatae.

Crataegus flabellata, Spach, La Tortue, *J. G. Jack*, May and October, 1900, Caughnawaga, May and September, 1900.

First described from plants cultivated at the Jardin des Plantes in Paris and known only in the descendants of these plants in European gardens, *Crataegus flabellata* appears to have been first discovered in a wild state by Mr. Jack. A tall shrub, well distinguished by the long acute spreading lobes of the leaves, by the large flowers with 20 stamens and pink anthers, and by the small oblong late-ripening fruit.

Crataegus densiflora. Leaves oval to ovate, acute or short-pointed at the apex, broadly cuneate or occasionally rounded at the base, laciniately cut above the middle into numerous short narrow acuminate spreading lobes, crenulate-serrate, the small teeth tipped with bright red glands; covered in early spring on the upper surface with soft white caducous hairs, glabrous on the lower surface, and at maturity thin but firm in texture, dark dull green and smooth above, pale yellow-green below, 2 to 3 in. long, 1½ to 2 in. wide, with slender midribs only slightly impressed above and thin primary veins arching to the points of the lobes; petioles slender, glandular, more or less winged above on vigorous leading shoots, from 1 to 1½ in. long; stipules narrowly obovate to linear lanceolate, finely glandular-serrate, 1½ in. long, caducous. Flowers ½ in. in diameter, on slender elongated pedicels in very compact narrow thin-branched tomentose or villose many-flowered cymes; bracts and bractlets finely glandular-serrate, caducous; calyx-tube narrowly obconic, glabrous, the lobes lanceolate, glandular with bright red glands, glabrous on the outer surface, densely villose on the inner surface, reflexed after anthesis; stamens usually 10, sometimes 5 to 10; filaments slender; anthers small, pale red or pink; styles 3 or 4, surrounded at the base by a thick ring of hoary tomentum. Fruit in erect slightly villose few fruited clusters, oblong, dark crimson or purplish, covered with a pale bloom, marked by large scattered lenticels, about ⅝ in. long, nearly ½ in. wide; calyx cavity narrow,

not deep, the lobes elongated, villose above, closely appressed or occasionally erect and incurved; flesh yellow, thin, sweet, soft and pulpy; nutlets 3 or 4, thick, very prominently ridged on the back, about $\frac{3}{16}$ in. long.

A shrub often somewhat fastigiate in habit with slender erect stems 12 or 15 feet in height, and slender glabrous only slightly zigzag lustrous branchlets marked by oblong orange-colored ultimately gray lenticels, dark yellow-green when they first appear, light chestnut-brown and very lustrous during their first season, often becoming orange-brown during their second year and finally ashy gray, and armed with stout or slender straight or slightly curved bright chestnut-brown spines from 1 to 1½ in. long.

Flowers from the 20th to the end of May. Fruit ripens from the first to the middle of September and often remains on the branches until early in October.

Rocky Limestone ridges, *J. G. Jack*, Rockfield, August 25, 1899, May and September, 1900, La Tortue, September and October, 1899, May and October, 1900, Caughnawaga, May and September, 1900.

Crataegus Holmesiana, Ashe (Sargent, Bot. Gazette, xxxi. 10), *J. G. Jack*, Chateaugay, August, 1894, Rockfield, July, 1899, May, 1900, Caughnawaga, September, 1899, May, 1900, Beauharvois, May, 1900. Also Lower Andoise, Cape Breton Island, *W. Faxon*, August, 1892, near Toronto, where it is probably common, *D. W. Beadle*, 1899.

Tenuifoliae.

Crataegus acutiloba, Sargent (Rhodora, iii. 23), Province of Quebec, *J. G. Jack*, Montmorency Falls, August 20, 1895, September, 1900, Adirondack Junction, May and August, 1899, Rockfield, September, 1900, Island of Orleans, September, 1900, Levis, September, 1900.

Crataegus pastorum, Sargent (Rhodora, iii. 24), *J. G. Jack*, Caughnawaga, August, 1899, Montreal, West, May and September, 1900, Adirondack Junction, September and October, 1900.

Crataegus scabrida, Sargent (Rhodora, iii. 29), *J. G. Jack*, Caughnawaga, August, 1899, Rockfield, May and September, 1900, Adirondack Junction, September, 1900.

Dilitatae.

Crataegus dilitata Sargent (Bot. Gazette, xxxi. 9), *J. G. Jack*, Caughnawaga, May and September, 1900.

Tomentosae.

Crataegus Laurentiana. Leaves oblong to oblong-obovate, acute or acuminate at the apex, gradually or abruptly narrowed from near the middle to the base, divided above, occasionally often deeply on vigorous leading shoots, into four or five pairs of narrow acute lobes, sharply and often doubly glandular-serrate except toward the base; in early spring yellow-green and roughened above by short appressed pale hairs and villose along the veins below with scattered white hairs, and at maturity subcoriaceous, dark green and glabrous on the upper surface and paler on the lower surface, with stout midribs and slender remote primary veins running to the points of the lobes and rarely slightly hairy below, 2 to 2½ in. long, 1 to 2 in. wide; petioles stout, more or less broadly winged above, deeply grooved, glandular with small dark mostly deciduous glands, villose in spring, ultimately glabrous, often dark red after midsummer like the lower side of the mibribs of the leaves of leading shoots, ½ to 1 in. long; stipules lanceolate to oblanceolate, finally glandular-serrate, bright red in fading, ⅓ to ½ in. long. Flowers ⅝ in. in diameter on elongated slender pedicels in broad loose many-flowered thin-branched compound huey corymbs; bracts and bractlets linear, finally glandular-serrate, bright red before falling, caducous; calyx-tube broadly obconic, coated at the base with long matted pale hairs, nearly glabrous or puberulous above, the lobes narrow, acuminate, conspicuously glandular-serrate, nearly glabrous on the outer surface, villose on the inner surface, reflexed after anthesis: stamens 10; filaments slender: anthers small, pale pink, fading purple; styles 3-5. Fruit in wide thick-branched slightly villose drooping or erect clusters, oblong, dark crimson, from ⅓ to ½ in. long; calyx prominent with a deep broad cavity and elongated glandular-serrate appressed lobes; flesh thin, yellow, finally becoming sweet and succulent; nutlets 4 or 5, thick and broad, about ¼ in. long, prominently ridged on the back with broad rounded ridges, grooved on the inner faces by two shallow irregularly shaped lateral depressions.

A stout much-branched shrub with thick stems 10 to 15 feet high, and stout zigzag branchlets, dark green and coated when they first appear with hoary tomentum, soon becoming glabrous, bright orange-brown and very lustrous during their first season and gray during their second year, and armed with very stout chestnut-brown lustrous spines from 2 to 3 in. long and often pointed toward the base of the branch.

Flowers the first week of June. Fruit ripens at the end of September and shrivels on the branches sometime before falling.

J. G. Jack, Rocky Banks of the St. Lawrence River in the village of La Tortue at the Lachine Rapids, August and October, 1899, May, 1900, and rocky limestone ridges, Caughnawaga, October, 1899, May, 1900.

Crataegus macracantha, Lindley, *J. G. Jack*, Adirondack Junction, October, 1899, La Tortue, September, 1899, Rockfield, Chateaugay, Isle of Orleans, May and September, 1900, Caughnawaga, May, 1900.

Crataegus succulenta, Link, *J. G. Jack*, Montreal West, September, 1899, Adirondack Junction, October, 1899, May, 1900, Caughnawaga, 1899, Rockfield, September, 1900; also near Toronto, *D. W. Beadle*, 1899.

Crataegus integriloba. Leaves broadly obovate to oval, cuneate, decurrent and entire at the base, irregularly laciniate above the middle with short acute lobes, coarsely doubly serrate with spreading glandular teeth; in early spring coated with soft pale caducous hairs and at maturity glabrous, thin but firm in texture, dark green and lustrous on the upper surface, pale yellow-green on the lower surface, 1½ to 3 in. long, 1¼ to 2 in. wide, with slender midribs and numerous straight primary veins deeply impressed above; petioles stout, grooved, more or less broadly winged above, often bright red on the lower side like the base of the midribs; stipules linear, finely glandular-serrate, villose, light red, ¾ to 1 in. long, caducous. Flowers ¾ in. in diameter, in compound thin-branched many-flowered villose cymes; bracts and bractlets linear, glandular-serrate, caducous; calyx-tube broadly obconic, coated towards the base with long matted white hairs, glabrous above, the lobes linear-lanceolate, elongated, entire or very rarely furnished with an occasional caducous gland; stamens 10; filaments rather short; anthers large, rose-color; styles 2 or 3, surrounded at the base by a narrow ring of soft white hairs. Fruit in erect or drooping broad loose slightly villose clusters, subglobose, bright scarlet, lustrous, marked by occasional large pale lenticles from ⅓ to ½ in. in diameter; calyx prominent with a comparatively broad deep cavity, the lobes elongated, entire, dark red on the upper side at the base, strongly reflexed, presistent; flesh thin, yellow, soft, sweet and pulpy; nutlets 2 or 3, about ¼ in. long, thick and broad, prominently often doubly ridged on the back, penetrated on the inner faces by two broad deep lateral grooves.

A tree from 12 to 18 feet in height with a straight erect stem 6 or 8 inches in diameter, wide-spreading or erect branches forming an open irregular head and stout only slightly zigzag glabrous branchlets marked by occasional small pale lenticels, very lustrous and red-brown or orange-brown during their first season, later becoming dull ashy gray, and armed with stout usually straight spines varying from 1½ to 2½ in. in length.

Flowers during the first week in June. Fruit ripens at the end of September or early in October.

Low limestone rocky ridges, *J. G. Jack*, Beauharnois, August 24, 1899, Caughnawaga, August 29, 1899, May and October, 1900,

Rockfield, September, 1900, Adirondack Junction, September, 1900. Well distinguished by its entire calyx-lobes from all the known forms of the small group of species distinguished by the longitudinal grooves on the inner faces of the nutlets, of which *Crataegus tomentosa*, L., is the type.

Coccineae.

Crataegus coccinea, Linnaeus (Sargent, Bot. Gazette, xxxi, 13), *J. G. Jack*, Caughnawaga, 1899, May, 1900, *J. M. Macoun*, Levis, September, 1900, *A. C. Waghorn*, Newfoundland, where it is probably the only species. Common on the coast of Maine and to be looked for in the coast region of the Maritime Provinces and in the valley of the lower St. Lawrence River.

Crataegus coccinea var. rotundifolia, Sargent (Bot. Gazette, xxi, 14), *J. G. Jack*, near Montreal, August 19, 1887, Isle of Orleans, August, 1895, September, 1900, Caughnawaga, October, 1899, May, 1900, Adirondack Junction, October, 1899, Chateaugay, October, 1899, May, 1900; *J. M. Macoun*, Levis, September, 1894.

Crataegus praecox Sargent (Rhodora, iii, 27), *J. G. Jack*. Chateaugay and Caughnawaga, May and August 1899. May, 1900.

Arnold Arboretum.

TWO NEW SMUTS ON ERIOCAULON SEPTANGULARE.

(Contribution from the Cryptogamic Laboratory of Harvard University, No. 46.)

G. P. Clinton.

In November of last year the writer finding some specimens of *Eriocaulon septangulare* With. at Ellis, Massachusetts, took a few of the plants home for herbarium specimens. Examination of the flower-heads a few days later disclosed the fact that the ovaries were infected with a new species of smut belonging to the genus Tolyposporium. A visit again to Ellis showed that all of the plants then to be found, several hundred, were infected, so it was merely a question of collecting all of the heads to get the smut in quantity.

The fungus is so inconspicuous that one is not likely to discover it

unless examining the heads with a magnifier. The flowers of this plant are androgynous and it is apparently only in the pistillate ones that the smut is found. The removal of the calyx and corolla of such discloses a greyish oval body one to two millimeters in length. This is the infected ovary and it generally shows distinctly the two lobes. It is completely filled with the spore-balls which are apt to give it a faintly nodulose appearance. The ovary-wall is easily ruptured, the spore-balls falling out and resembling very minute seeds. They are black, perfectly opaque under the microscope, and vary from imperfectly oblong to sub-spherical, generally with sides somewhat angled through pressure. They range from 65–275 μ in diameter.

The spore-balls are made up of a large number of light-colored spores. These have a slight violet tint and are enveloped by a very thin outer coat provided with evident dark winged reticulations or wrinkles which firmly glue the spores together into the balls and give these their dark color. Upon the rupture of the spore-balls through pressure, these coverings are more or less broken showing on the spores as reticulations or spine-like processes or even becoming entirely detached. The spores (fig. 1) are subspherical, 8–11 μ in diameter (exclusive of the processes) and resemble closely those of *Tolyposporium bullatum* on *Panicum Crus-galli* but are not angular. The character of the infected ovaries of the latter species is also quite distinct, though this is a character that is perhaps more dependent on the host than on the fungus.

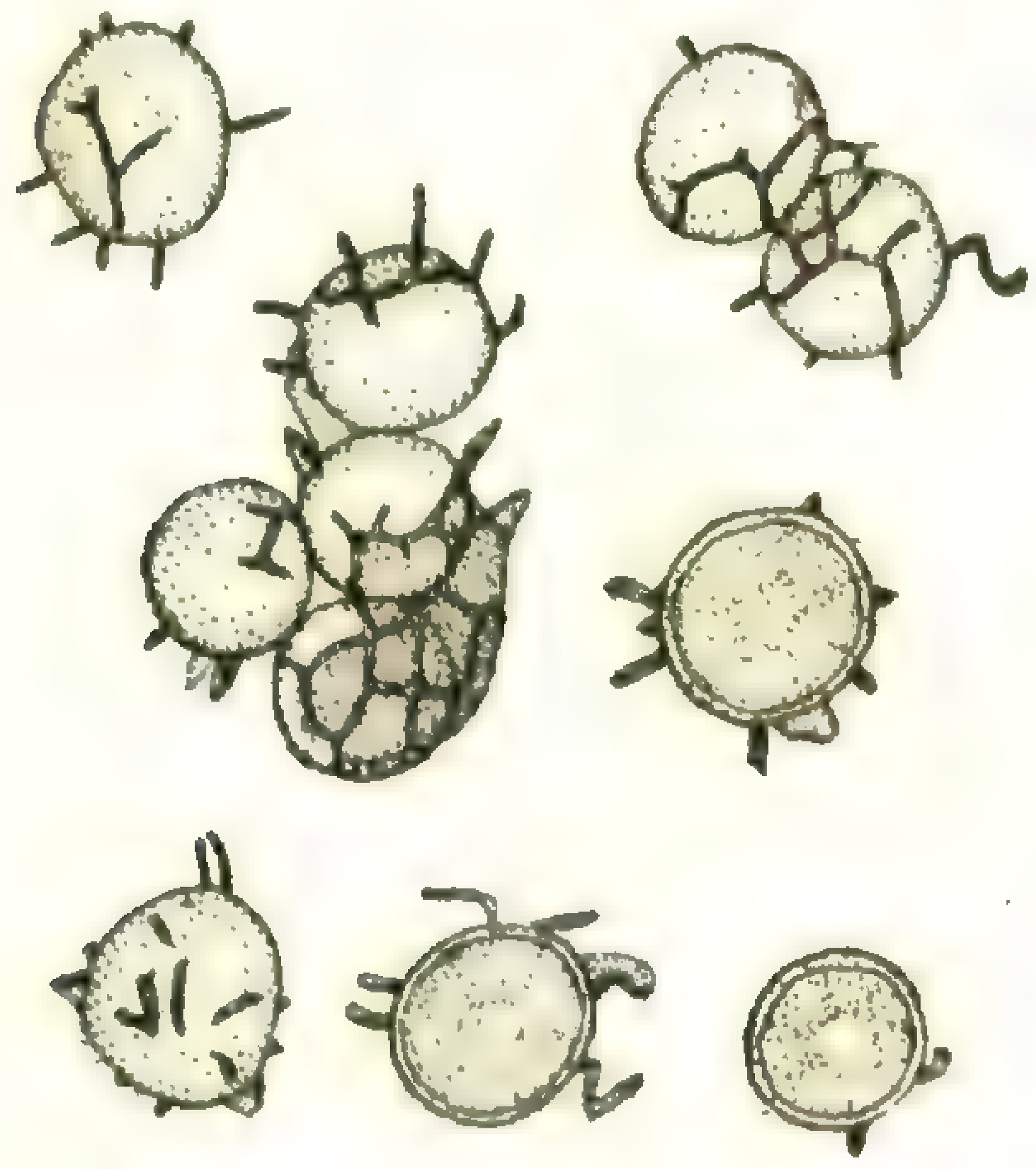

Fig. 1.

Attempts to germinate this smut were successful only in the cultures kept in the incubator, this being about 36° C. Germination, when successful, generally began by end of second day. In water a septate pro-mycelium several times the length of the spore and about 2.5 μ wide was developed which generally became empty of protoplasm at the apex or at the base and frequently developed a prominent lateral branch. Very often the germ-threads broke up into joints or became separated from the spore by the gelatinization of the empty base. The threads were finally emptied of protoplasmic contents by

the production of lateral sporidia, a few at a time, which readily fell off in the water and did not while attached or afterward reproduce themselves to any extent by budding. The sporidia were quite variable, oblong with ends somewhat acute, and chiefly 6–12 by 1–2.5 μ. In solid nutrient media the germination of the spore-balls, when successful, was much more luxuriant, so that multitudes of more vigorous and connected sporidia were formed on the promycelia and were eventually extended further out into the medium by radiating threads, which at intervals gave rise to them, sometimes there being developed a series of distinct groups of connected sporidia though more likely through luxuriant budding these were all fused together as a common mass surrounding the spore-ball. Cultures of the sporidia act in much the same way.

In a search at South Billerica later in the month for plants of *Eriocaulon septangulare* that contained seeds which could be used for infection experiments with the Tolyposporium, it was found that all of the plants then at this locality were infected with a smut that was different from that collected at Ellis. Upon examination this proved to be a new species of Ustilago. The infected heads were smaller than those containing the Tolyposporium, but like that fungus the smut was found only in the ovaries of the pistillate flowers. In this case, however, there were occasionally found ovaries that had matured their seeds. The infected ovaries are somewhat smaller than those infected by the other smut, are oval in shape and generally broader than long, being about 0.75 by 1 millimeter. They are more decidedly two lobed and being quite dark colored are more apt to be seen by the naked eye. Neither are they so easily ruptured and when broken open disclose a tightly packed mass of dark olive spores. In one case a head was found that contained both smuts. The two, however, are readily distinguished with the aid of a hand lens when their characteristics have been learned. The spores of the Ustilago (fig. 2) are quite different from those of the Tolyposporium, being irregularly polygonal to sub-spherical

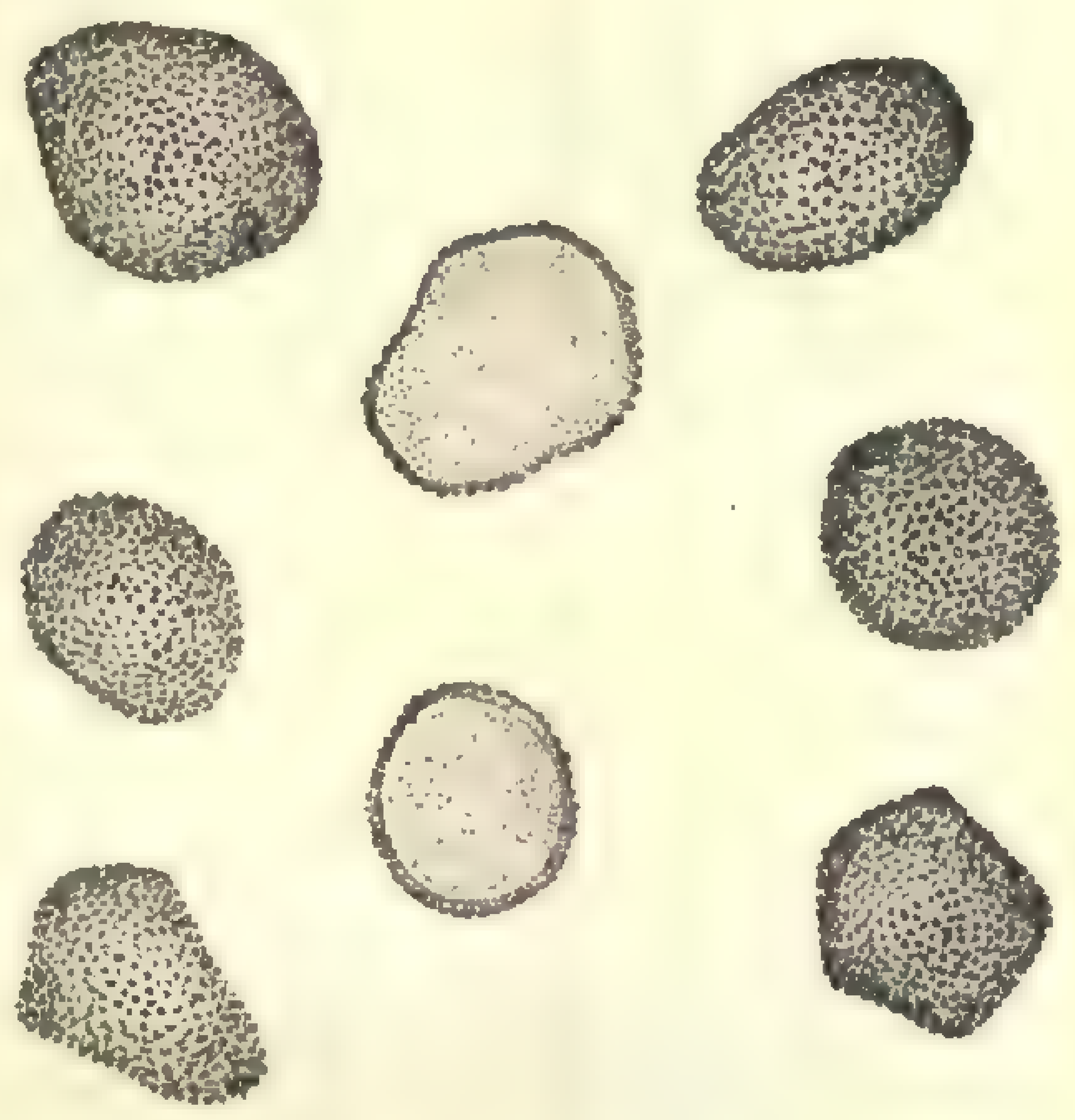

Fig. 2

or occasionally more elongated, much darker, prominently verruculose and 9–15 μ in diameter.

This Ustilago was only germinated in water in the incubator and was found to produce usually a four celled pro-mycelium about 3 μ wide and four or five times as long as diameter of spores. This produced terminal and lateral sporidia, which fell off before others were produced. Sometimes the germ-threads became more elongated, septate and empty at base and had a tendency to restrict the protoplasm to several places in the thread from which the sporidia were sprouted off, sometimes two or even three standing side by side. Such threads are apt to become detached from the spores and break up somewhat into joints. The sporidia vary considerably, generally being oblong in shape and in size about 6–12 by 1.5–3 μ.

The writer is indebted to Professor Thaxter for aid in the study of these smuts and expects to treat more fully of their life history in a paper on some American Ustilagineae that is in preparation. The drawings of the spores of the two smuts as given here are magnified about 900 diameters. The specific characters may be given as follows:

Tolyposporium Eriocauli, n. s. Sori greyish, oval, somewhat two-lobed, 1–2 mm. in length, easily ruptured; spore-balls firm, black, perfectly opaque, irregularly oblong to subspherical, frequently somewhat angled, 65–275 μ in diameter; spores sub-spherical to spherical, light-colored, adhering together by dark winged folds which on rupture of balls show as reticulations or spine-like processes or become entirely detached, 8–11 μ in diameter exclusive of processes.

Inconspicuous in ovaries of pistillate flowers of *Eriocaulon septangulare* With., Ellis, Massachusetts.

Ustilago Eriocauli, n. s. Sori black, oval, very distinctly two lobed, usually about 0.75 mm. long by 1 mm. wide, firm, not easily ruptured; spores tightly packed together in a dark olive mass, irregularly polygonal to sub-spherical though occasionally more elongated, prominently verruculose, 9–15 μ in diameter.

Inconspicuous in ovaries of pistillate flowers of *Eriocaulon septangulare* With., South Billerica, Massachusetts.

Cambridge, Massachusetts.

A NEW NORTHERN EUPATORIUM.

Edw. L. Greene.

E. boreale. Stout, erect, 2 feet high or more, glabrous except as to the inflorescence: leaves ample, very thin, dark-green, feather-veined, the veins not light-colored, 3 or 4 inches long, often 3 inches broad toward the base, broadly subcordate-ovate, abruptly acuminate, coarsely and evenly serrate, the serratures 20 to 25 on each side, some of the larger with a secondary tooth; petioles ¾ to 1½ inches long, somewhat ascending: cymes terminal, but with one pair from the axils of the uppermost leaves: peduncles and pedicels rather densely pubescent, but involucres glabrous, their bracts thin, only obscurely striate: tips of the corolla-teeth somewhat hairy: achenes dark-brown, sharply thin-angled, the angles of those of the outer series remarkably setose-hispidulous, the surface glabrous.

This is a proposed segregate from the *E. ageratoides* of recent authors, and seems to form, in New England and northward, the bulk of what passes for that species. The plant of Maryland and Virginia which I take for the true *E. ageratoides* is very different, exhibiting a much firmer leaf texture, the leaves distinctly cordate and with a somewhat falcate acumination, the whole of a decided yellow-green color, the veins almost white. And this plant is not only pubescent throughout, even to the involucre, it is leafy mostly about the middle of the stem, and the cymes are rather amply panicled above the leaves. It is such a plant as this, with panicled inflorescence and distinctly cordate leaves that the Cornutian figure calls for; and that old author, in his text, distinctly mentions the light-green hue of the foliage. The achenes in this are perfectly glabrous, as in all other Eupatoriums of this group except *E. boreale.* Good herbarium specimens of this New England plant have been distributed by Dr. Robinson from Jaffrey, N. H.; others are in various herbaria from the White Mountain region. It is in the Canadian Survey Herbarium from Bass River, Kent Co., New Brunswick, collected by Fowler, while the southernmost station from which I have seen a specimen is Ipswich, Mass., the specimens distributed long ago by Oakes.

Mr. Fernald's No. 57, from along the St. Johns River, Maine, is

a plant which I should not refer here. It is in some points more like *E. ageratoides.* Its foliage is light-green, the veins also whitish, the serratures of the leaf margin are small, and there is a sprinkling of almost scabrous hairs on both faces of the foliage; but the specimen seen by me is not in fruit, so that the character of the achenes can not be made out. It is a plant which should be investigated.

The only published description of an *Eupatorium* to which *E. boreale* is somewhat near to answering is that of Poiret's *E. Fraseri.* But that is to be a plant with a panicled inflorescence, the whole herb perfectly glabrous throughout; and its habitat is Carolina. There are other discrepancies also; but the outline and indentation of the leaf, as shown in La Marck's fig. 4 of Plate 672, suggests a possibility of identity between the two. Yet, upon such crude figures as this, nothing can, with anything approaching certainty, be established; and, after long hesitation, and careful study, I have thought it best to call attention to this northern plant under a new name, rather than to call it *E. Fraseri* with double or triple question marks.

Catholic University, Washington, D. C.

SOME OBSERVATIONS ON ORCHID FRAGRANCE.

A. LeRoy Andrews.

By no means the least of the factors entering into the great problem of cross-fertilization in flowers is the matter of fragrance or other odor serving as one means of attracting insects and securing their co-operation in the plant's struggle to perpetuate its kind. Singularly enough comparatively little scientific attention has been given to this important feature, investigations along the line of insect-pollination tending rather to the subject of interesting mechanical and chemical contrivances, to coloring, nectar-receptacles, honey-guides, etc.

It is not my purpose here to enter into any considerable discussion of the subject, but simply, by way of a suggestion, to note the results of careful observations upon our native orchids. The orchid, whose sole serious purpose in life seems to be self-perpetuation, presents unexcelled opportunities for the study of anything connected with cross-fertilization. We may reasonably expect it then to illustrate well the various facts of flower-fragrance and its relations to insects.

Of course we must bear in mind that in all probability odors imperceptible to the human sense of smell exist, which may possess for the small insect the very greatest attraction, and the tiny, unattractive Microstylis may be to the little gnat a perfect censer of fragrance; this probability does not, however, render valueless a classification of odors from the human standpoint.

Our natural, primary division would distinguish the distinctively agreeable from those not distinctively agreeable which we may term by way of contrast disagreeable. Laying aside individual eccentricities of like and dislike it will be readily seen that all odors will fall pretty definitely into the one or the other class. The disagreeable I would subdivide into the positively disagreeable, i. e., those of the carrion or other similar scent, the purpose being the attraction of flies by the suggestion of the presence of carrion, and the negatively disagreeable, i. e., those which may be called disagreeable from the lack of any agreeable quality, faint, oily, pungent smells, etc., probably attractive to some kind of insect, or possibly incidental or serving some other purpose. The agreeable I would similarly subdivide into those possessing the peculiar, distinctive flavor which we denominate perfume or true fragrance, and those characterized by a merely sweetish odor, one in no way distinct nor justifying the name perfume or fragrance, simply a suggestion of the presence of nectar.

The plants, particularly the roots, of all our terrestrial orchids possess a characteristic odor described by Mr. Baldwin (Orchids of New England) as "musky," which can hardly be called pleasing except for the associations which it always suggests, but which, as being also present in the flowers of certain species like *Habenaria orbiculata* habitually fertilized by night-moths, undoubtedly plays a part in the attraction of nocturnal insects.

Of the carrion odor and its relatives we have no examples in our orchids, though several tropical species display it in a very marked degree.

As negatively disagreeable I would mention *Cypripedium pubescens* whose "heavy, oily odor" noted by Burroughs is well known and furnishes an easy mark of distinction between it and the closely related *C. parviflorum*. One may sometimes detect an unpleasant, penetrating odor in *C. acaule*. Here belongs *Goodyera repens* var. *ophioides* which exhales a characteristic, pungent odor wholly different from that of *G. tesselata*.

Those orchids which are slightly sweet, but scarcely enough so to be termed fragrant in the ordinary sense, include *Cypripedium acaule* and *C. spectabile* with possibly *Orchis spectabilis*. I would insert also *Goodyera tesselata* in which a sweet, pleasant scent is readily noted. Another mark of this species, that I have not seen elsewhere mentioned, is a pinkish tinge almost invariably present in the flowers and sometimes of a very pronounced shade.

Naturally the greatest number of species belong to the fragrant division and it is interesting to observe the disagreements in the attempts of different botanists to describe them. I have already mentioned *Cypripedium parviflorum* whose peculiar, almost sickishly sweet fragrance distinguishes it from *C. pubescens*. Of the Habenarias *H. dilatata* claims our admiration for an unusually strong and very sweet, but characteristic fragrance, which would seem to indicate a wide difference between it and *H. hyperborea* which is scentless. Kraenzlin, however, in his recent great work on orchids (Orchidacearum Genera et Species) restores it to its old place as a variety of *H. hyperborea*. Baldwin complains because Gray referred to *H. psychodes* as "fragrant" and contradicts him with the statement that all the specimens which he had found had a rank smell. Kraenzlin describes them as "*suaveolentes*" and "*wohlriechend*." The truth of the matter I find from my own experience and from experiments with others is this: the odor, which resembles no other with which I am acquainted, at first always impresses one as rank, nauseating, disagreeable; to one persisting, however, it becomes very attractive, and the remembrance of it remains with one a long time. *Spiranthes Romanzoffiana* and *S. cernua* resemble each other in a very pronounced fragrance, though I have found apparent variations of the latter (Rhodora, I, 110) which were characterized along with other differences by an entire lack of fragrance. Arethusa and its relatives all exhale a very delicate violet fragrance. Baldwin takes exception to the statements of Chapman, Goodale and Burroughs that the Arethusa is fragrant, as also to those of the last-mentioned writer and Meehan concerning the fragrance of *Calopogon pulchellus*, though admitting that quality in *Pogonia ophioglossoides*. Thoreau on the other hand refers with the greatest disgust to the disagreeably "snaky" odor of the Pogonia.

I have found the following to be true of both the Pogonia and the Calopogon, and suppose that the case is the same with the Arethusa,

but have not had the same opportunity of examining fresh blossoms of the last. The early blooms of both Pogonia and Calopogon are fresh, clear and vivid in coloring, and possess very perceptible and very attractive perfumes, similar, but of slightly different flavors. A later visit to their homes shows them in much greater numbers, but lighter and faded in color, and with no sign of fragrance. This is true at the later date of even newly-opened blossoms. In the freshly-opened flowers of still another species which I have nowhere seen described as scented, *P. verticillata*, I find a very delicate fragrance faintly suggestive of the odor of *P. ophioglossoides.* The species of the greenhouse display similar characteristics, and will fall readily into the same classification.

These few fragmentary remarks touch upon a subject which to me seems of peculiar interest, and with which are connected some of the pleasantest recollections of many a collecting trip.

Thetford, Vt.

NOTES ON THE FLORA OF WOODS HOLE, MASSACHUSETTS.

Hubert Lyman Clark.

The following notes are based on observations made during August, 1895, July and August, 1899, and part of July and August, 1900, while the writer was engaged in biological work at the Laboratory of the United States Fish Commission. The village of Woods Hole is situated on a strip of ground between Vineyard Sound and Buzzards Bay, and, southwestward from the village, this is extended as a long and narrow tongue of land known as Penzance, and occupied by a few handsome summer residences, each surrounded by extensive lawns and more or less numerous flower-beds, the presence of which doubtless accounts for some of the interesting "escapes" noted below. These chance introductions seem to be confined chiefly to two widely separated spots, one on the Buzzards Bay side, the other on the Woods Hole side of Penzance.

Northward from Woods Hole the land broadens and becomes considerably diversified, containing some extensive woods, several ponds, and at least one cedar swamp. Since 1895 the increased popu-

larity of Falmouth (of which Woods Hole is a part) as a summer resort, and the corresponding decrease in the amount of neglected and waste land has brought about some changes in the flora, some species once common having become rare, while many new ones have been introduced. It has seemed worth while to publish these notes, not only to record the introduced forms, but also several species not previously reported east of Rhode Island. While the geographic position of Woods Hole is such that the occurrence of these species is by no means surprising, it is none the less worthy of note. It will be interesting to observe how many and which of the introduced species persist. The plants marked with an asterisk (*) were kindly identified for me at the Gray Herbarium.

Bromus hordaceus L. Not rare along roadsides.

Bromus tectorum L. Found once, in 1899.

Scirpus olneyi Gray. Abundant in some of the salt marshes along the Sound between Woods Hole and Falmouth.

Habenaria clavellata Spreng. (*H. tridentata* Hook.) A single small specimen of this orchid was found on the edge of the salt marsh between Eel Pond and Buzzards Bay.

* *Chenopodium anthelminticum* L. Found August 9, 1899, at a dumping place on Penzance, but not observed in 1900.

* *Tetragonia expansa* Murr. Growing with the preceding in 1899, but not found in 1900.

Myriophyllum pinnatum (Walt.) B. S. P. (*M. scabratum* Michx.) Not rare.

Dianthus barbatus L. Found on low waste land on Penzance in 1900, not previously noted there.

Lunaria annua L. Found once in 1899 in a waste place beside a woodland road.

Genista tinctoria L. While not seen at Woods Hole this species occurs across the "Hole" on Naushon Island.

Cytisus scoparius L. Common in the field back of the Fish Commission work-shop, where firmly established.

Foeniculum foeniculum (L.) Karst. (*F. vulgare* Gaertn.). Found at a dumping ground on Penzance in 1899 and persisting at the same place in 1900.

* *Hypochaeris radicata* L. In lawns on Penzance in 1899 but not found there in 1900. It has also been noted in a lawn at Tempest Knob, Wareham in 1899.

Centaurea cyanus L. Found on waste land on Penzance in 1899 and more abundantly in 1900. Apparently established there.

Helianthus petiolaris Nutt. Waste land on Penzance in 1899 but not found in 1900.

* *Dahlia coccinea* Car. Common on waste land on Penzance in 1899 and also abundant in 1900. Apparently established there. Some plants were found in 1900 with rays uniformly dark red.

* *Coreopsis lanceolata* L. By a roadside in Falmouth and once on Penzance in 1899 but not seen in 1900.

OLIVET COLLEGE, Michigan.

CALLITRICHE AUSTINI IN SOUTHWESTERN CONNECTICUT.

E. H. EAMES, M. D.

THE interesting but decidedly inconspicuous *Callitriche Austini* Engelm. is found sparingly within a few miles of New Haven (Orange), thence westward, usually in small quantities and at infrequent intervals, fully twenty miles. In Fairfield there are several colonies covering from one to three square rods, approximately.

It seems to prefer the damp earth of little used cart-paths or old roads, in woods or partial shade along their borders, and but little elevated above adjoining, or at least not distant, salt marshes. Occasionally it is so situated that every heavy rain will submerge it for a time, but the ensuing mud, while not at all unfavorable to the growth of the plant, soon settles to a moderate degree of moisture. From its habit of hugging the earth in such places, it is not rarely covered with mud during the subsidence of turbid waters, although its growth is not materially affected thereby.

Search for it in early June has usually been disappointing, whereas, by July 1 it may be seen in flower sparingly, and all through the month in increased quantity. Fully mature dull black fruit may be found in the middle of the month, while a few days more suffice for an abundance of it; even well into August, in most favorable situations, it still clings to the crumbling or decaying stems.

The height of its season seems to be the last two weeks of July, or until the burning heat of midsummer. At that time it might be

profitable for observers farther east to make careful search for this species so little known in our New England flora.

A seemingly overlooked record for this plant is that of the late Prof. L. N. Johnson,[1] who observed it in the sand along the edge of Mill River, near Samp Mortar Rock, Fairfield. This station is several miles inland and at an elevationof about twenty-five feet. Within my own experience it is confined to the coastal plain, and never in strictly sandy soil.

Bridgeport, Connecticut.

COLLECTING SEAWEEDS IN THE TROPICS.

[The conditions under which collecting must be done vary much in different regions, and perhaps in no department is the difference more marked than with algae. The following notes, though not an addition to our knowledge of the botany of New England, may yet be of interest to New England botanists. They are in a letter from Mrs. C. E. Pease of Malden, describing the experiences of herself and her sister, Miss Eloise Butler of Minneapolis, Minn., on visits to the island of Jamaica, the chief object of the visits being the collection of algae. — F. S. C.]

Sometimes the weeds were at long distances from the shore, yet growing in shallow water in eel grass or on coral reefs and ledges. Most of our seaweeding was done from boats rowed by two or three strong experienced boatmen. We would be rowed out to the reefs or to the shallow places overgrown with grass, the water even there being up to our waists; then jump from the boat into the water, to fish about for our weeds. Of course we always wore bathing suits while seaweeding, and boy's thick hip rubber boots. On the reefs or by the ledges the waves were often strong enough to take us off our feet. Then we would cling closely together, one holding on to the other while she plunged in for the weeds. Even then we would sometimes be washed from our footing. The boatmen would be busy keeping the boat from being dashed on the rocks, and stand ready to assist us back into the boat, often with the greatest difficulty.

Even if the weeds grew near land, often the shores were so precipitous that to reach the weeds we must row to them.

Avrainvillea longicaulis, at Montego Bay, grew embedded in mud among eel grass in shallow water near a small island consisting of a

[1] Bull. Torr. Club, xix: 89.

mangrove swamp. It was discovered by the sense of feeling as we were digging in the mud among the eel grass roots for *Caulerpa*. We were continually feeling through the thick soles of our heavy rubber boots, a sensation as of stepping on drowned kittens. With fear and trembling we put our hands down to investigate, and pulled up the curious fleshy weed somewhat resembling a downy, swollen *Udotea*. The plants harbored numerous worms and other small sea animals.

At Port Antonio was our happy hunting ground in 1894, a coral reef running out from the base of a steep bluff. The water was extremely shallow out some distance. Perhaps we had half an acre of safe wading. We did not consider it safe to wade where we could not see the bottom, owing to sharks, octopi, etc. At this place we waded out to where the surface was jagged and rocky, the water about to our waists. At this depth we found *Caulerpa clavifera* growing like lovely little clusters of green grapes, in big soggy masses. Here also were clumps of all those limy things, *Halimedas*, *Amphiroas*, *Galaxauras*, *Cymopolias*, etc. They followed inshore, and with them upon the rocks were those green, warty, potato-ball-like *Dictyosphaerias*. Nearer the shore the water flattened out to nothing, and the bottom was sand, like powdered shells. Most of the plants mentioned dropped out, but *Caulerpa ericifolia* and *C. plumaris* covered the bottom, as club mosses grow in the woods. Such a pretty sight! Day after day we searched this reef for the "Mermaid's Shaving brush" you had told us we would most likely find, but were giving up in despair, and were leaving the water for the last time when just at the shore, the water barely deep enough to cover them, I noticed peculiar little raised mounds in the sand. With my foot I brushed them over and revealed the *Penicillus capitatus*, so long searched for. They grew as abundantly as seedling evergreens in a neglected Maine pasture lot, and we hastily brushed the sand aside and gathered as many as we could carry.

WEBERA PROLIGERA IN AMESBURY, MASSACHUSETTS. — I have been much interested of late in the study of those mosses which do not multiply themselves alone by the agency of spores, but by means of vegetative growths serving the same purpose. It is astonishing how abundant these plants will become in regions where it is almost impossible to find the least sign of fruit. There is a small brook in this town about a mile in length, flowing through sandy land

and emptying into the Merrimac river. For some distance from the head of this stream the banks are covered with various mosses, but I have never found any of the Webera group, the brook is then joined by another little rivulet which has cut for itself a channel in the live sand some thirty feet in depth. These banks of wet sand are densely covered with *Webera proligera* (Lind.) Kind. From this place on, both banks of the brook are covered with this moss, although hardly any fruit can be found anywhere. It is easy to see how this wonderful multiplication is brought about, for in the autumn one can find plenty of the peculiar bulbils, which grow on the stem of this moss near its apex, but in the spring these growths are mostly gone. In the winter season the banks are covered with ice and snow, which collect the bodies, carry them along the stream and deposit them in the mud farther down, thus producing plants all along. — J. W. Huntington, Amesbury, Massachusetts.

Two Wool-waste Plants at Lawrence, Massachusetts. — In connection with the article in the February number of the Rhodora by Mr. Emile F. Williams noting the finding of two species of Erodium in Tewksbury, the following may be of interest.

On June 14, 1900, I found growing within two feet of a pile of wool dust at the Arlington Mills, Lawrence, a single plant of *Clarkia pulchella*, Pursh, bearing one finely-developed flower. A careful hunt failed to reveal any more plants of this species.

This plant, if I mistake not, is a native of Oregon and California, and its presence here is easily accounted for, since the mill uses large quantities of so-called Territory wool from Oregon, Montana, Idaho, etc.

On June 15th I found in the same place a profusely flowering plant of *Gilia androsacea*, Steud., the lilac corolla with dark eye causing it to be easily identified. This, also, is a western plant, as are all of the genus.

There were also several species of *Compositae* not native, but I have not as yet identified them. The coming season I hope to make a study of this special locality. — John A. Collins, Jr., Lawrence, Massachusetts.

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THE NEW ENGLAND SPECIES OF THE GENUS PANICUM.

F. Lamson-Scribner and Elmer D. Merrill.

The paper here presented on the "New England Species of the Genus Panicum" is based almost entirely upon material loaned by the New England Botanical Club, the Gray Herbarium and a number of individuals whose names are given whenever their specimens are cited. Much of the value of the paper rests upon the fact that the great number of localities given, indicates very fully the distribution of the species enumerated.

In spite of the length of time which the authors have had for the preparation of this synopsis and the ample material with which they have been so kindly supplied by many New England botanists, the work is far from perfect and probably no one will realize this more fully than do the authors themselves. We can never come to a satisfactory conclusion in regard to the limitations of certain of the species now recognized in the group which contains *Panicum dichotomum* and in fact, the authors in preparing this paper have not always agreed on the limitations of certain species and varieties. It is possible that the examination of the herbaria of some of the older authors may clear up some of the doubtfully identified species, but we are not sure that this would be the result as these authors very frequently had an imperfect conception of specific limits in this group and their type or so-called type material is apt to consist of heterogeneous collections which later botanists regard as distinct species. In no case is this more likely to occur than in the species which we have here taken up under the name of *Panicum unciphyllum* Trin., the limitations of which are very doubtful indeed, and this species of Trinius

has been taken up as appearing to afford the best solution of a difficulty which the authors had to meet.

Hoping that the efforts here presented will be of some service to our New England friends, it is offered to them with the plea that they will exercise a measure of charity towards the imperfections which may appear.

Panicum Linn. Sp. Pl. 55. 1753.

Spikelets 1-flowered or sometimes with a staminate flower below the hermaphrodite terminal one, in spikes, racemes, or panicles. Glumes four, the first usually much shorter than the others, very rarely wanting (some species of the section *Syntherisma*); second glume empty, equaling or somewhat shorter than the third, which is empty or has a palea or even a staminate flower in its axil; fourth glume usually smooth and shining, coriaceous, much firmer in texture than the others. Palea similar in texture to its glume and closely embraced by it. Grain inclosed within the hardened fruiting glume and palea, free — Annuals or perennials, varying greatly in habit of growth, foliage and inflorescence.

Species about 400, throughout the tropical and subtropical regions of both hemispheres, a few only in the temperate regions. Several species are cosmopolitan and appear as weeds throughout all civilized countries. About 150 species and varieties are now recognized as occurring within the United States, while 35 species and 5 varieties and forms are recorded in the present paper, as growing in New England.

For convenience in classification the following sections are recognized:

§ I. Syntherisma Walt. Fl. Carol. 76. 1788. (as a genus) (*Digitaria* Scop. Fl. Carn. ed. 2, **2**: 52. 1772, not Heist. 1763.) Spikelets borne in pairs, one sessile, and one pedicellate, in simple, slender, one-sided racemes, which are digitate or fasiculate at the summit of the culm; glumes four, sometimes three, by suppression of the first one. This section is intermediate between *Panicum* and *Paspalum* (Page 98).

1. P. filiforme Linn.
2. P. sanguinale Linn.
3. P. humifusum (Pers.) Kth.

§ II. Eupanicum Benth. in Benth. & Hook. Gen. Pl. 3: 1102. 1883. Spikelets awnless, all pedicellate in panicles, the branches of which are single or fascicled, generally much branched, usually naked below, spreading, or sometimes erect.

A. Basal and culm leaves similar in shape; spikelets acute or acuminate. Homophylla (Page 101).

(*a*) Primary branches of the panicle spreading, the secondary ones appressed, rather densely flowered, spikelets 3 mm. long (*Excelsa* Bentham).

4. P. agrostoides Spreng.
5. P. longifolium Torr.

(*b*) Panicles strict; branches appressed; spikelets 5 to 6 mm. long.

6. P. amaroides Scribn. & Merrill

(*c*) Panicles diffuse.

7. P. virgatum Linn.
8. P. verrucosum Muhl.
9. P. proliferum Lam.
10. P. capillare Linn.
11. P. minimum (Engel.) Scribn. & Merrill.
12 P. miliaceum Linn.

B. Basal leaves different in shape and much shorter than those of the culm, leaves of the branches smaller and more crowded than those of the primary stem; spikelets usually obtuse or abruptly acute. (*Panicum depauperatum* excepted) Heterophylla (Page 107).

13. P. depauperatum Muhl.
14. P. linearifolium Scribn.
15. P. xanthophysum A. Gray,
16. P. clandestinum Linn.
17. P. macrocarpon Le Conte.
18. P. latifolium Linn.
19. P. scribnerianum Nash.
20. P. barbulatum Michx.
21. P. mattamusketense Ashe,
22. P. dichotomum Linn.
23. P. bicknellii Nash.
24. P. commutatum R. & S.
25. P. boreale Nash.
26. P. werneri Scribn.
27. P. nitidum Lam.
28. P. clutei Nash.
29. P. sphaerocarpon Ell.
30. P. atlanticum Nash.
31. P. unciphyllum Trin.
32. P. lanuginosum Ell.
33. P. columbianum Scribn.

§ III. Echinochloa Beauv. Agrost. 53. *t. 11.* 1812. (as a genus).— Spikelets sessile or short pedicellate, densely imbricate in thick three to four ranked racemes, which are alternate on the common rachis, second and third glumes muricate-hispid, very acute, or generally bearing a long scabrous awn. (Page 126.)

34. P. crus-galli Linn.
35. P. walteri Pursh.

Analytical Key to the Species.

1. Spikelets in one-sided, usually simple racemes 2
1. Spikelets variously paniculate 6
2. Racemes slender, digitate or sub-fasciculate, outer glumes pubescent. 3
2. Racemes thick and racemed along the main axis, outer glumes muricate-hispid 5
3. Rachis of the racemes triangular, the angles naked, not winged; spikes very slender . . . . 1. P. FILIFORME.
3. Rachis of the racemes flattened with the lateral angles broadly winged 4
4. Spikelets about 3 mm. long; second glume one-half as long as the spikelet . . . . 2. P. SANGUINALE
4. Spikelets about 2 mm. long; second glume about equaling the spikelet . . . . 3 P. HUMIFUSUM
5. Sheaths glabrous, flowering glume ovate, abruptly pointed 34. P. CRUS-GALLI
5. Sheaths hispid; flowering glume ovate-lanceolate, acuminate 35. P. WALTERI
6. Leaves all alike, spikelets acute (*Homophylla*). 7
6. Leaves dissimilar, basal ones shorter and broader than those above; leaves of the branches usually much smaller and more crowded than those of the primary stem; spikelets abruptly acute or obtuse (*P. depauperatum* excepted) (*Heterophylla*) 15
7. Spikelets 1.5 to 3 mm. long 8
7. Spikelets 4 to 6 mm. long 13
8. Panicles ovoid or oblong; primary branches spreading or ascending; secondary branches appressed. Perennials 9
8. Panicles ovate, often as broad as long, their slender few-flowered branches widely spreading. Annuals or perennials 10
9. Culms stout, much branched; secondary branches of the panicle densely flowered; lateral panicles numerous; spikelets 1.5 mm. long, rather blunt; ligule naked . . . . 4. P. AGROSTOIDES
9. Culms slender, simple; secondary branches of the panicle few-flowered; lateral panicles usually wanting or occasionally one; spikelets very acute, 2 mm. long; ligule ciliate. . . . . 5. P. LONGIFOLIUM
10. Sheaths glabrous 11
10. Sheaths papillose-pubescent 12
11. Outer glumes warty-roughened (verrucose) . . . 8. P. VERRUCOSUM
11. Outer glumes smooth; first glume broadly obtuse . 9. P. PROLIFERUM
12. Culms stout, finally much branched throughout, spikelets very acute, 2.5 mm. long, solitary . . . . 10. P. CAPILLARE
12. Culms slender, branched only at the base; spikelets rather blunt, 2 mm. long or less, usually in pairs . . . . . 11. P. MINIMUM
13. Annual; sheaths hispid . . . . 12. P. MILIACEUM
13. Perennial; sheaths glabrous 14
14. Panicle very narrow, contracted; spikelets 5 to 6 mm. long 6. P. AMAROIDES

14. Panicle diffuse; spikelets 4 to 4.5 mm. long . . . 7. P. VIRGATUM
15. Culm leaves erect, linear, often involute 16
15. Culm leaves lanceolate or linear-lanceolate, rounded, truncate, or clasping at the base, generally spreading 17
16. Spikelets about 3.5 mm. long, acute or acuminate 13. P. DEPAUPERATUM
16. Spikelets 2 to 2.5 mm. long, obtuse . . . 14. P. LINEARIFOLIUM
17. Spikelets 3 to 5 mm. long 18
17. Spikelets 2.5, rarely 3 mm. long, or less 22
18. Panicles strict, narrow, the branches erect; leaves erect
15. P. XANTHOPHYSUM
18. Panicles ovate, open, the branches spreading; leaves spreading or ascending 19
19. Leaf-blades ample, 2 to 3 cm. broad, cordate and clasping at the base 20
19. Leaf-blades smaller about 1 cm. broad, not clasping at the base
19. P. SCRIBNERIANUM
20. Sheaths papillose-hispid; spikelets 2.5 to 3 mm. long; panicles generally much included within the leaf-sheath, sometimes long-exserted
16. P. CLANDESTINUM
20. Sheaths glabrous or soft pubescent; spikelets 3 to 5 mm. long . 21
21. Nodes strongly bearded; sheaths and leaves generally soft-pubescent, sometimes nearly glabrous; spikelets 4 to 5 mm. long
18. P. LATIFOLIUM
21. Nodes naked; sheaths and surface of the leaves glabrous; spikelets 3 to 4 mm. long . . . . 17. P. MACROCARPON
22. Whole plant nearly glabrous, nodes sometimes bearded; spikelets glabrous or pubescent 23
22. Whole plant more or less pubescent 31
23. Nodes bearded 24
23. Nodes naked or only with a few spreading hairs 25
24. Spikelets 1.5 mm. long, glabrous . . . . 20. P. BARBULATUM
24. Spikelets 2.2. mm. long, pubescent . . 21. P. MATTAMUSKETENSE
25. Spikelets glabrous, 2 mm. long . . . . 22. P. DICHOTOMUM
25. Spikelets pubescent 26
26. Leaf-blades cordate-clasping at the base; spikelets nearly spherical; ligule obsolete . . . . 29. P. SPHAEROCARPON
26. Leaf-blades not cordate-clasping at the base, spikelets ovate or elliptical; ligule present 27
27. Spikelets 2 mm. long or more 28
27. Spikelets 1.5 mm. long . . . . 27. P. NITIDUM
28. Lower internodes of the culm puberulent; spikelets 2.5–3 mm. long (*P. bicknellii* may be looked for here) . . 24. P. COMMUTATUM
28. Lower internodes glabrous 29
29. Leaves spreading, rather rigid; spikelets 2.3 mm. long 28. P. CLUTEI
29. Leaves erect, rather soft; spikelets 2 mm. long 30
30. Leaves 8–15 mm. wide . . . . 25. P. BOREALE
30. Leaves 3–6 mm. wide . . . . 26. P. WERNERI
31. Spikelets 2 mm. long or more 32

31. Spikelets less than 2 mm. long 34
32. Plant pilose-pubescent throughout with long, spreading white hairs
30. P. atlanticum
32. Plant not pilose-pubescent 33
33. Culms glabrous; spikelets 2 mm. long . . . . 26. P. werneri
33. Culms puberulent, at least below; spikelets 2.5–3 mm. long
23. P. bicknellii
34. Culms appressed-pubescent or puberulent . 33. P. columbianum
34. Culms with spreading pubescence 35
35. Leaves, firm and usually rigid; panicle usually purplish, branches rather rigid . . . . 31. P. unciphyllum
35. Leaves thin, with a peculiar lustre; panicle green, rather densely flowered, branches capillary and flexuose 32. P. lanuginosum

§ I. Syntherisma.

Spikelets borne in pairs, one sessile and one pedicellate, in simple, slender, one-sided racemes, which are digitate or fasciculate at the summit of the culm; glumes four, sometimes three by suppression of the first one.

* Rachis three-angled, not winged.

1. Panicum filiforme Linn. Sp. Pl. 57. 1753. (*Digitaria filiformis* Muhl. Descr. 131. 1817; *Syntherisma filiformis* Nash, Bul. Torr. Bot. Club, **22**: 420. 1895.

A slender, simple or somewhat branched, annual, 1.5 to 7 dm. high, with long-exserted panicles of 2 to 5 slender, erect or ascending racemes, 2–10 cm. long. Sheaths flattened, keeled, papillose-hirsute; ligule a scarious irregularly toothed ring 1–2 mm. long; leaf-blades 3–20 cm. long, 1–4 mm. wide, erect, usually glabrous on the lower surface, the upper surface and margins rough, papillose-hirsute at the base. Racemes alternate, the rachis 3-angled, the angles hispidulous. Spikelets in pairs, about 1.8 mm. long, elliptic, acute, on hispidulous 3-angled pedicels; first glume obsolete; second glume about three fourths as long as the spikelet, 3-nerved, the margins and internerves pubescent with long appressed hairs; third glume slightly shorter than the fourth, 7-nerved, pubescent with appressed hairs; flowering glume deep chestnut brown at maturity, striate, apiculate. Palea of equal length and similar texture.

General distribution: in dry sandy soil. Massachusetts to Michigan, south to North Carolina and Indian Territory. August to September.

Massachusetts: Waltham, sandy ground, *W. P. Rich*, Sept. 2, 1889; Springfield, *Maria L. Owen*, Sept. 9, 1885; East Longmeadow, *W. Deane*, Aug. 31, 1895; Norwood, Purgatory swamp, *E. F.*

Williams, Sept. 15, 1895; Framingham, *E. C. Smith*, Sept. 5, 1897; Dedham, *E. & C. E. Faxon*, no date; West Quincy, gravelly road, Blue Hills Reservation, *W. P. Rich*, Sept. 30, 1894; West Hingham, Great Hill, *J. R. Churchill*, Sept. 2, 1890. RHODE ISLAND: Providence, *J. F. Collins*, Sept. 1, 1894; no locality, *W. W. Bailey*, in Herb. N. E. Bot. Club; no locality, *J. L. Bennett*, 1865. CONNECTICUT: New Haven, *J. A. Allen*, Sept. 15, 1878; Ayer City, *C. W. Swan*, Aug. 30, 1882.

* * Rachis flat, wing-margined.

2. PANICUM SANGUINALE Linn. Sp. Pl. 57. 1753. (*Digitaria sanguinalis* Scop. Fl. Carn. ed. 2, 1: 52. 1772; *Syntherisma praecox* Walt. Fl. Car. 76. 1788: *Paspalum sanguinale*, Lam. Tabl. Encycl. 1: 176. 1791; *Syntherisma sanguinalis*. Dulac. Fl. Hautes Pyr. 77. 1867.)

A much-branched, leafy annual 3–12 dm. high, at first erect but finally prostrate at the base and rooting at the lower nodes, with 3 to 10 erect or ascending racemes 5 to 18 cm. long. Sheaths loose, shorter than the internodes, the lower ones densely papillose-hirsute, the upper ones sparingly so or glabrous; ligule a scarious ring, 0.5 mm. long; leaf-blades 4–20 cm. long, 4–10 mm. wide, erect or ascending, more or less papillose-hirsute on both surfaces. Panicle finally exserted, racemes usually digitate, rachis triangular, the angles broadly winged, hispidulous on the margins. Spikelets 2.5–3 mm. long, elliptic-lanceolate, acute, in pairs on 3-angled pedicels; first glume minute, triangular, glabrous; the second glume about one-half as long as the spikelet, 3-nerved, the margins and internerves pubescent with appressed hairs; third glume about as long as the flowering glume, 7-nerved, pubescent on the margins; flowering glume yellowish-white when mature, apiculate, elliptic-lanceolate.

General distribution: in cultivated fields, roadsides and waste places, throughout North America. July to September. Introduced from Europe.

MAINE: North Berwick, *J. C. Parlin*, Sept. 1893 and Sept. 1894, East Auburn, roadsides, *E. D. Merrill*, July, 1898. MASSACHUSETTS: Bourne, sandy roadsides, *W. P. Rich*, Aug. 21, 1898; Lynnfield; roadside. *W. P. Rich*, Aug. 21, 1892; Chelsea, cultivated ground, *W. P. Rich*, July 29, 1888; Truro, sandy roadsides, *W. P. Rich*, Sept. 8, 1888; Stoneham, border of Spot Pond, *W. P. Rich*, Sept. 29, 1892; Revere, Oak Island, *H. A. Young*, Aug. 13, 1882, and Sept. 20, 1878; West Cambridge, clay pit, *E. F. Williams*, Aug. 28, 1897; Malden, Golding Mills, *F. S. Collins*, Sept. 25, 1887; Charlestown, *C. E. Perkins*, July, 28, 1881; Attleboro, *J. R. Churchill*, Aug. 6, 1897; Dorchester, *J. R. Churchill*, Sept. 7, 1883 and Sept. 20, 1888; Cambridge, yard, *W. Deane*, Aug. 24, 1883; Andover, *J. Blake*, Sept. 5, 1882, and Aug. 27, 1884; Nonquit, *E. L. Sturtevant*, Sept. 5, 1888; South Framingham, *E. L. Sturtevant*, Sept. 19, 1890.

Connecticut: South Glastonbury, 9 Francis Wilson, Aug. 23, 1892.

3. Panicum humifusum (Pers.) Kunth, Rev. Gram. 1: 33. 1835. (*Digitaria humifusa* Pers. Syn. 1: 85. 1805; *Panicum lineare* Krock. Fl. Sil. 1: 95. 1787, not Linn. 1762; *Syntherisma glabra* Schrad. Fl. Germ. 1: 163. 1806: *Panicum glabrum* Gaud. Agrost. 1: 22. 1811; *Paspalum ambiguum* D. C. Fl. Gall. 123. 1806; *Syntherisma linearis* Nash, Bul. Torr. Bot. Club, 22: 420. 1895. *Syntherisma humifusa* Ryd. Mem. N. Y. Bot. Gard. 1: 469. 1900.)

A slender, glabrous, at length much branched below, and prostrate annual 2 to 5 dm. high, with flat leaves and 2 to 6 slender, diverging spikes which are 2 to 8 cm. long. Sheaths flattened, glabrous; ligule a scarious ring about 2 mm. long; leaf-blades 1.5–13 cm. long, 2.5–6 mm. wide, erect or nearly so, glabrous. Racemes alternate or approximate in pairs, the rachis triangular, the lateral angles broadly winged, hispidulous on the margins. Spikelets slightly over 2 mm. long, elliptic, acutish, usually in pairs; outer glumes usually purplish, the first generally obsolete; second and third glumes about equal in length, slightly shorter than the flowering glume, pubescent with appressed hairs on the margins and internerves, the second 3-nerved, the third 7-nerved; flowering glume deep chestnut brown when mature, striate, acute.

General distribution: in cultivated grounds and waste places, Nova Scotia to Ontario and Minnesota, south to Louisiana, July to September. Introduced from Europe.

Maine: North Berwick, *J. C. Parlin*, Aug., 1891 and Aug. 25, 1892. Bradley, sandy river bank, *M. L. Fernald*, Sept. 16, 1897; Orono, waste places, *M. L. Fernald*, July 30, 1889; Mattawamkeag, railroad yard, *M. L. Fernald*, Sept. 14, 1898; East Auburn, lawns, *E. D. Merrill*, Aug. 12, 1896; South Poland, *Kate Furbish*, no date; Peru, *J. C. Parlin*, Sept., 1886. New Hampshire: Jaffrey, dry roadsides, 599 *B. L. Robinson*, Aug 29, 1898. Massachusetts, Plymouth, *Oakes*, no date; West Cambridge, clay pit, *E. F. Williams*, Aug. 28, 1897; West Quincy, *W. F. Rich*, Sept. 3, 1894; Chelmsford, *C. W. Swan*, Aug. 22, 1882; Cambridge, lawn, *W. Deane*, Aug. 28, 1883; Andover, *J. Blake*, June 21, 1883; Lynnfield, wood-road, *W. P. Rich*, Aug. 21, 1892; Dedham, low ground by railroad *W. P. Rich*, Aug. 22, 1897; Waltham, sandy ground, *W. P. Rich*, Sept. 2, 1889; Dorchester, *J. R. Churchill*, Sept. 7, 1884; Nonquit, *E. L. Sturtevant*, Sept. 5, 1888. Connecticut: New Haven, *J. A. Allen*, Sept. 30, 1877.

§ II. Eupanicum.

Spikelets awnless, all pedicellate in panicles, the branches of which are single or fascicled, usually naked below, spreading, or sometimes erect.

A. Basal and culm leaves all similar in shape, spikelet acute. (HOMOPHYLLA.)

* Panicle ovoid or oblong, primary branches spreading or ascending, secondary ones usually appressed, and densely flowered : spikelets short-pedicellate, not exceeding 3 mm. in length.

4. PANICUM AGROSTOIDES Sprengel, Pugill. **2**: 4. 1815—Muhl. Gram. 119. 1817.—An erect, caespitose, glabrous, much branched perennial 4–6 dm. high, with compressed culms, long leaves and spreading pyramidal panicles 10–20 cm. long. Nodes smooth; sheaths compressed, loose, shorter than the internodes; ligule very short, naked; leaf-blades 3–5 dm. long, 4–8 mm. wide, acuminate, scabrous on the margins. Panicles terminating the culms or their branches, usually purplish, primary branches spreading, the secondary generally appressed and densely flowered giving the panicle a glomerate appearance. Pedicels scabrous, usually bearing few long white hairs at the apex. Spikelets nearly 2 mm. long, ovate, acute; first glume 3-nerved, acute, slightly scabrous on the keel at the apex, about one-half as long as the spikelet; second and third glumes equal, 5-nerved, acute, slightly scabrous on the keel, the third enclosing a hyaline palea about 1.2 mm. long, flowering glume ovate, about 1.3 mm. long, smooth. Palea as long as the glume, similar in texture.

General distribution: in wet grounds Maine to Minnesota, south to Florida and Texas, July to September.

MAINE: Bradley, Chemo Pond, *F. P. Briggs*, Sept. 1891; Brownfield, old fields, *E. D. Merrill*, Aug. 18, 1896; Denmark, intervales of the Saco River, *W. H. Merrill*, 1894; North Berwick, shores of mill-pond, 751 *J. C. Parlin*, Aug. 19, 1896; Androscoggin Lake, *Kate Furbish*, 1894. NEW HAMPSHIRE: Rye Beach, *W. Deane*, Aug. 29, 1886. MASSACHUSETTS: Malden, *R. Frohock*, 1880; Blue Hills, *W. H. Manning*, Aug. 23, 1894; Winchester, *W. P. Rich*, Aug. 19, 1888, and Aug. 5, 1894; Lynn, *W. P. Rich*, Aug. 25, 1889; Milton, *J. R. Churchill*, Sept. 18, 1887; Cambridge, *W. Deane*, Aug. 24, 1883; Andover, *J. Blake*, Aug. 14, 1882; Newburyport, *W. P. Conant*, no date. RHODE ISLAND: Providence, *J. Blake*, Sept. 10, 1857. CONNECTICUT: New Haven, *J. A. Allen*, Sept. 19, 1877; Southington, 621 *L. Andrews*, Aug. 18, 1898; Huntington, *E. H. Eames*, Aug. 6, 1895.

5. PANICUM LONGIFOLIUM Torr. Fl. U. S. 149. 1824.— An erect glabrous perennial 3–6 dm. high, with simple or rarely slightly branched slender culms, elongated narrow leaves and few-flowered panicles 10–20 cm. long. Culms compressed; nodes smooth; sheaths loose, compressed, glabrous, shorter than the internodes; ligule short, ciliate with erect white hairs 1–2 mm. long; leaf-blades 20–30 cm. long, 2–4 mm. wide, usually scabrous, long acuminate. Panicles open; primary branches spreading or ascending, elongated, slender;

secondary branches appressed, generally bearing 1 to 3 spikelets. Spikelets 2.5 mm. long, very acute or acuminate; first glume acute, one-half as long as the spikelet, 3-nerved, scabrous on the keel at the apex; second and third glumes equal, 5-nerved, acuminate, one-third longer than the obtuse flowering glume.

General distribution: in moist soil, Rhode Island to Florida, August to September.

Rhode Island: Shannock, *L. C. Moore*, Aug. 14, 1896; Lake Werden, *E. & C. E. Faxon*, Aug. 24, 1881.

This species is distinguished from *Panicum agrostoides* by its slender, simple, much flattened culms, long narrow leaves, ciliate ligule, long slender panicle branches and larger, more acute spikelets which are almost racemosely arranged, not glomerate as in that species.

* * Panicle strict, narrow, the branches appressed; spikelets 5 to 6 mm, long.

6. Panicum amaroides Scribn. & Merrill, U. S. Dept. Agr. Div. Agros. Cir. **29**: 5. 1901. (*Panicum amarum minor* Vasey & Scribn. U. S. Dept. Agr. Div. Bot. Bul. **8**: 38. 1889, not *P. capillare minor* Muhl. 1817.)—A glabrous, glaucous, non-caespitose perennial, 3 to 8 dm. high, from horizontal rootstocks, with thick often involute leaves and narrow, contracted panicles. Culms erect, often somewhat branched below, stout, the lower internodes very short; nodes smooth. Sheaths loose, glabrous, crowded and overlapping; ligule a dense fringe of soft white hairs 2 to 3 mm. long; leaf-blades very thick, smooth, lanceolate, acuminate, not narrowed at the rounded base, 1 to 3 dm. long, 5 to 10 mm. wide, strongly involute, at least above. Panicles 1 to 2.5 dm. long, few-flowered, the branches 1 to 7 cm. long, appressed. Spikelets glabrous, ovate, acuminate, 5 to 6 mm. long; first glume clasping the base of the spikelet, ovate, acuminate, strongly 7-nerved, three-fourths, or sometimes as long as the spikelet, usually scabrous on the keel toward the apex; second glume slightly exceeding the third, 7-nerved, similar to the first; third glume thin, faintly 7-nerved, enclosing the flowering glume and palea, subtending a thin palea of equal length and a staminate flower; flowering glume 3 to 3.5 mm. long, elliptical-ovate, smooth.

General distribution: in sands along the coast, Connecticut to Florida and Mississippi, August to October.

Connecticut: New Haven, *D. C. Eaton*, no date; *J. A. Allen*, Sept. 30, 1876; *A. L. Winton, Jr.*, 1887.

This species is readily distinguished from *Panicum amarum* Ell., by its smaller size, smaller panicles, larger spikelets and longer first glume, and is strikingly different from that species in habit of growth.

* * * Panicle diffuse, the slender capillary branches widely spreading, single or fascicled; spikelets generally long-pedicellate.

† Perennials.

‡ A stout erect plant; spikelets glabrous.

7. *Panicum virgatum* L. Sp. Pl. 59. 1753. — A stout, erect perennial, 9–15 dm. high, with strong creeping rootstocks, long, flat leaves and ample spreading panicles. Culms smooth, terete; sheaths smooth, ciliate along the margins above; ligule very short, naked, or densely ciliate and long pilose; leaf-blades 25–60 cm. long, 4–10 mm. wide, scabrous on the margins, sometimes pilose above, near the base, otherwise smooth, long-acuminate-pointed. Panicle 15–50 cm. long, the branches solitary, or several together, more or less widely spreading, rather rigid, the lower 10–25 cm. long. Spikelets ovate, acuminate, 4–5 mm. long, the acuminate first glume about one-half the length of the spikelet, 3 to 5-nerved; second glume usually longer than the others, 5 to 7-nerved, as in the third, which has a palea and usually a staminate flower in its axil; flowering glume smooth and shining, distinctly shorter than the larger outer glumes.

General distribution: in sandy soil, usually along streams and about ponds, Maine to North Dakota and Colorado, south to Florida and Texas (Mexico), June to October.

Maine: Wells, *Kate Furbish*, 1879; Kennebunk, *W. H. Manning*, July 28, 1894; Sebec, shore of Sebec Lake, *J. W. Freese*, 1895; Oldtown, Pushaw Bridge, *M. L. Fernald*, Sept. 18, 1897. New Hampshire: Hindsdale, 549 *B. L. Robinson*, 1898. Vermont: Vernon, open grounds, 87 *B. L. Robinson*, Aug. 2, 1898. Massachusetts: Malden, *R. Frohock*, 1879; Revere, *W. P. Rich*, Aug. 5, 1888; Oak Island, *H. A. Young*, Aug. 6, 1882, July 30, 1882 and July 27, 1879, also *W. Deane*, Sept. 13, 1894; Montague, *J. R. Churchill*, July 28, 1857; Nonquit, *E. L. Sturtevant*, Aug. 29, 1888 and July 25, 1889; Framingham, *E. C. Smith*, July 27, 1897: Saugus, *W. P. Rich*, Aug. 4, 1889; Wareham, along borders of a salt marsh, *W. P. Rich*, Aug. 6, 1891; Nantasket Beach, meadow, *W. P. Rich*, July 23, 1896; Milton, *J. R. Churchill*, Aug. 5, 1883; Dorchester, *J. R. Churchill*, 1883; Springfield, *W. Deane*, Aug. 31, 1895. Rhode Island: East Providence, *J. F. Collins*, July 24, 1892; Providence, *J. Blake*, Sept, 10, 1857. Connecticut; New Haven, *J. A. Allen*, Sept. 19, 1877.

‡ ‡ A weak spreading plant; outer glumes warty-roughened.

8. Panicum verrucosum Muhl. Gram. 113. 1817. (*Panicum debile* Ell. Sk. Bot. S. C. and Ga. 1: 129. 1817, not Desf. 1800.) — A slender, branching perennial, with flat leaves and few-flowered, spreading panicles. Culms very smooth, weak, decumbent or reclining, rarely erect, 3–9 dm. long. Sheaths smooth, much shorter than the internodes, ciliate on the margins above; ligule very short, ciliate; leaf-blades lanceolate, 8–15 cm. long, 4–8 mm. wide, scabrous on the margins, contracted at the base, very acute. Panicles 8–20 cm. long, capillary, branches solitary or in pairs the lower 5–10

cm. long, naked below, the secondary branches appressed and few (1–4) flowered. Spikelets 2 mm, long, oval, acute; outer glumes apparently nerveless, the first smooth, one-fourth as long as second and third, which are tuberculate-roughened (verrucose); flowering glume abruptly sharp pointed or submucronate, smooth. Palea with a callus-like elevation at the base.

General distribution: in damp, rich, shaded soils, Massachusetts to Tennessee, Florida and Louisiana, mostly near the coast, July to September. Rare in New England.

MASSACHUSETTS: Plymouth, *Oakes*, no date; Centreville, gravelly shore of Nine Mile Pond, *W. P. Rich*, Sept. 4, 1898; Springfield, island in Red House Pond, *F. W. Batchelder*, Sept. 28, 1894.

This species is readily distinguished by its slender straggling habit and rough, nerveless outer glumes.

† † Annuals.

‡ Glabrous or nearly so.

9. PANICUM PROLIFERUM Lam. Encycl. 4: 747a. 1797. (*Panicum geniculatum* Muhl. Gram. 123. 1817.) — A smooth, usually much-branched annual, with rather coarse spreading or ascending (rarely erect) stems, 6–12 or 18 dm. long, flat leaves and diffuse terminal and lateral panicles. Sheaths smooth, lax, somewhat flattened; ligule ciliate; leaf-blades 15 to 30 or 60 cm. long, 4–20 mm. wide, acute, scabrous on the margins and sometimes also on the prominent nerves, rarely pilose on the upper surface. Panicles pyramidal, 10 to 12 or 40 cm. long, the primary and secondary branches spreading, scabrous. Spikelets rather crowded on short appressed and scabrous pedicels, ovate lanceolate, acute, 2–3 mm. long, smooth, green or purplish; first glume embracing the base of the spikelet, usually obtuse and nerveless, rarely 1–3-nerved, one fourth to one-third as long as the nearly equal, acute 5 to 7-nerved second and third glumes, the latter sometimes having a hyaline palea in its axil; floral glume elliptical, subacute, smooth and shining, a little shorter than the larger outer glumes. Anthers saffron yellow.

General distribution: in wet soil, Maine to Pennsylvania and Nebraska, south to Florida and Texas, July to September.

MAINE: North Berwick, *J. C. Parlin*, Aug. 28, 1891; Saco, waste places, *J. C. Parlin*, Aug. 27, 1887; Gott's Island, *F. L. Harvey*, Aug., 1896; Kennebunk, *J. Blake*, Aug. 23, 1880. MASSACHUSETTS: Truro, cranberry meadow, *W. P. Rich*, Sept. 8, 1898; Agawam, *W. Deane*, Sept. 3, 1895; Andover, *J. Blake*, Sept. 1, 1883; Nantucket, Gibb's Pond, *W. Deane*, Sept. 11, 1885, also *J. R. Churchill*, Sept. 11, 1885; South Boston, *H. A. Young*, Sept. 25, 1888, *W. P. Rich* Aug. 29, 1888; Boston, *E. C. Smith*, Sept., 1899; Framingham, 751 *E. C. Smith*, Sept. 1899; also *E. L. Sturtevant*, Sept. 28, 1890; Dartmouth, *E. L. Sturtevant*, Sept. 13, 1889; Hingham, 751 *E. C.*

Smith, Sept. 1899; Marthas Vineyard, *Sydney Harris*, Aug. 27, 1895; Blue Hills, Pine-tree Pool, *W. H. Manning*, Sept. 2, 1895; Plymouth, *Oakes* collection, in Gray Herbarium; Medford, *F. S. Collins*, Sept. 15, 1887; Uxbridge, *J. W. Robbins*, Sept., 1864. CONNECTICUT: New Haven, *J. A. Allen*, Sept., 1876.

‡ ‡ More or less hirsute.

10. PANICUM CAPILLARE Linn. Sp. Pl. 58. 1753.— An annual with usually coarse, branching stems, 3–9 dm. long, very hairy leaf-sheaths and capillary, widely-spreading panicles, which are terminal on the culm or its branches. Culms geniculate and branching near the base, rarely simple, generally pilose or pubescent below the bearded nodes. Sheaths pilose to densely hirsute, with spreading hairs; ligule very short, finely ciliate; leaf-blades flat, lanceolate or linear, acute, usually thinly hairy on both sides, margins scabrous and ciliate near the base, the hairs throughout spring from small papillae, those on the leaf-blade being confined chiefly to the principal nerves. Panicle diffuse, 8–30 cm. long, the branches solitary, in pairs or rarely whorled, the ultimate branches and pedicels strongly hispid. Spikelets 2 mm. long, ovate, acute, or abruptly acuminate-pointed, smooth; first glume clasping the base of the spikelet, obtuse or acute, 1 to 3-nerved, about one-third the length of the 5 to 7-nerved and nearly equal second and third glumes, the acute tips of these are sometimes minutely pubescent; flowering glume smooth and shining, elliptical, obtuse, or subacute, a little shorter than the larger outer glumes. Variable.

General distribution: in dry soil, waste ground and cultivated fields, Nova Scotia to British Columbia, south to Florida, Nevada and Texas. July to September. Introduced from Europe.

MAINE: Fort Fairfield, gravelly shores, *M. L. Fernald*, Sept. 9, 1896; Dover, roadsides, *M. L. Fernald*, Aug. 27, 1894; Orono, dry fields, *M. L. Fernald*, Aug. 28, 1889; East Auburn, waste places, *E. D. Merrill*, Aug. 1897. NEW HAMPSHIRE: Jaffrey, dry sandy soil, 396 *B. L. Robinson*, Sept. 1897; Randolph, *J. R. Churchill*, Aug. 4, 1889; Gilmanton, *J. Blake*, Sept. 6, 1869. MASSACHUSETTS: Malden, *F. S. Collins*, Aug. 9, 1887; Revere, Oak Island *H. A. Young*, Aug. 27, 1882, Nonquit, *E. L Sturtevant*, Sept. 5, 1888; South Framingham, *E. L. Sturtevant*, Aug. 11, 1890; South Boston, *W. P. Rich*, Aug. 29, 1888, a low reduced form; Mystic Pond, *W. P. Rich*, Sept. 29, 1891; Dorchester, *J. R. Churchill*, Sept. 8, 1883; Cambridge, *W. Deane*, Aug. 23, 1883 and Sept. 20, 1886.

11. PANICUM MINIMUM (Engel.) Scribn. & Merrill, U. S. Dept. Agr. Div. Agros. Cir. **27**: 4. 1900. (*Panicum capillare minimum* Engel. in Scribn. Tenn. Agr. Exp. Sta. Bul. 7^2: 44. *fig. 40.* 1894; *Panicum minus* Nash, Bul. Torr. Bot. Club, **22**: 421. 1895, not *Panicum capillare minor* Muhl. Descr. 124. 1817.)

A slender annual, rarely more than 3 dm. high, with long-pilose sheaths narrow flat leaves, and oval or pyramidal, few-flowered panicles, 8–16 cm. long. Leaves 5–10 cm. long, 2–6 mm. wide, erect, more or less pubescent. Panicles open, the lower branches 5–7 cm. long, spreading or ascending. Spikelets about 1.5 mm. long, elliptic, acute, smooth, usually borne in pairs at the extremities of the ultimate branches of the panicle; first glume about one-third as long as the equal, acute, second and third ones; flowering glume somewhat shorter than the third.

General distribution: In dry woods, thickets and on the margins of lakes and streams, New Brunswick to Georgia and Missouri. August to September.

Maine: Mattawamkeag, river banks, 2802 *M. L. Fernald*, Sept. 14. 1898; Masardis, *M. L. Fernald*, Sept. 8, 1898. Vermont: Head of Lake Memphramagog, *E. Tuckerman*, Sept. 1859, in Gray Herbarium (*Panicum soboliferum* Tuckerman in Herb.). Massachusetts: North Andover, *J. Blake*, Sept. 27, 1883.

It is possible that this form is only worthy of varietal rank, although the extreme form is very distinct from *Panicum capillare*. In many cases, however, the two species can only be separated arbitrarily.

12. Panicum miliaceum Linn. Sp. Pl. 58. 1753. — A rather stout, erect annual 3 to 8 dm. high. Culms glabrous or hirsute. Sheaths papillose-hirsute, often with tawny hairs; ligule very short, ciliate; leaf-blades 10–30 cm. long, 6–16 mm. wide, more or less pubescent. Panicle open, rather densely flowered, 12–35 cm. long; branches erect or ascending. Spikelets 5 mm. long, acuminate; first glume about two-thirds as long as the spikelet, 5 to 7-nerved, acuminate: second glume acuminate, equaling the spikelet in length, 13-nerved, somewhat exceeding the 7 to 13-nerved third glume which subtends an empty palea: flowering glume about 3 mm. long, obtuse, obscurely 5-nerved, becoming indurated and shining.

General distribution: in waste places, Maine to Pennsylvania, July to September, introduced from Europe.

Maine: Orono, waste places, *F. L. Harvey*, Sept. 1897 also, gravelly roadsides, *M. L. Fernald*, Oct. 1, 1889; North Berwick, *J. C. Parlin*, Sept. 1892. Vermont: Burlington, introduced about lumber yards, *Ezra Brainerd*, Sept. 4, 1895. Massachusetts: Cambridge, roadside and also on ballast, *M. L. Fernald*, Aug. 1891; East Cambridge, *F. S. Collins*, Sept. 2, 1887; Boston, waste ground, *E. F. Williams*, Aug. 27, 1896; South Boston, waste ground, *H. A. Young*, Aug. 2, 1879; Newton, *E. C. Smith*, July 12, 1899; Nantucket, waste ground, *W. Deane*, Sept. 9, 1885; Dracut, *C. W. Swan*, Aug. 4, 1884; Beachmont, growing among stones on ridge of beach, *W. P. Rich*, Aug. 12, 1890. Rhode Island: Providence, *J. F. Collins*, Sept. 2, 1894.

B. Basal leaves very different in shape, and much smaller than those of the culm; leaves of the branches smaller and more crowded than those of the primary stem; spikelets usually abruptly acute or obtuse (***Panicum depauperatum*** excepted) (HETEROPHYLLA).

* Leaves linear, elongated, very narrow, erect; panicles small, few-flowered, the differentiated basal leaves rarely evident.

† Spikelets 3.5 mm. long, apparently beaked.

13. PANICUM DEPAUPERATUM Muhl. Gram. 112. 1817. (*Panicum strictum* Pursh. Fl. Am. Sept. 1: 69. 1814, not R. Br. 1812; *Panicum involutum* Torr. Fl. U. S. 124. 1824).—A slender erect or ascending perennial, usually much branched near the base, 1.5 to 4 dm. high, with very narrow erect leaves 8 to 20 cm. long, ¾ mm. wide, few-flowered narrow panicles 4 to 10 cm. long, and nearly smooth spikelets about 3.5 mm. long. Sheaths glabrous or hirsute; leaves erect, mostly crowded at the base, the upper culm-leaf usually exceeding the panicle. Spikelets ovate, acute, in dried specimens appearing somewhat beaked; first glume about one-third as long as the spikelet, clasping the base of the spikelet, second and third glumes equal, 7 to 9-nerved, glabrous or sometimes pilose with few hairs.

General distribution: open woodlands and gravelly fields, Nova Scotia to Manitoba, south to Florida and Texas.

MAINE: East Auburn, *E. D. Merrill*, Aug. 1898; Southport, *M. L. Fernald*, Aug. 8, 1894; Rumford Falls, *C. H. Knowlton*, July 8, 1893; South Berwick, open dry woods, *M. L. Fernald*, Sept. 26, 1897. NEW HAMPSHIRE: Jaffrey, dry hillsides, *B. L. Robinson*, July 12, 1898. VERMONT: Rutland, 1757, *W. W. Eggleston*, June 12, 1899; Colchester, *L. R. Jones*, Aug. 31, 1900. MASSACHUSETTS: Walpole, gravelly roadsides, *W. P. Rich*, June 7, 1896, *J. R. Churchill*, June 7, 1896; Malden, *F. S. Collins*, June 14, 1887; Mt. Wachusett, *J. F. Collins*, July 13, 1893; Lynnfield, *H. A. Young*, June 17, 1879; Framingham, *E. C. Smith*, June 24, 1892; Nonquit, *E. L. Sturtevant*, May 28, 1889; Milton, borders of woods, Blue Hills, *W. P. Rich*, July 1, 1891; Melrose, rocky wooded hillsides, cascade region, *W. P. Rich*, June 18, 1894; Truro, dry fields and hillsides, *W. P. Rich*, June 21, 1898; Dorchester, Mattapan, *J. R. Churchill*, June 16, 1886; Waltham, sandy soil, *W. Deane*, June 22, 1884; Nantucket, *J. R. Churchill*, July 3, 1886; Concord, *H. Mann*, no date; West Gloucester, *C. W. Swan*, July 8, 1893; Gloucester, Eastern Point, *E. L. Rand & B. L. Robinson*, June 7, 1896; Stony Brook Reservoir, Metropolitan Park Flora, *G. L. Chandler*, June 17, 1895. RHODE ISLAND: Providence, *J. F. Collins*, June 8, 1892. CONNECTICUT: Waterford, dry sandy woods, Fog Plain, 7 *C. B. Graves*, July 5, 1898; Montville, woods on Poll's Hill, 81 *C. B. Graves*, June 19, 1897; Ledyard, woods on Decatur Hill, 86 *C. B. Graves*, June 10, 1897.

† † Spikelets 2 to 2.5 mm. long, obtuse.

14. Panicum linearifolium Scribn. U. S. Dept. Agr. Div. Agros. Bul. **11**: 42, *pl. 1.* 1898. (*Panicum depauperatum* Muhl. Gram. 112. 1817, in part; *Panicum depauperatum laxa* Vasey, U. S. Dept. Agr. Div. Bot. Bul. **8**: 29. 1889, not *Panicum laxum* Swartz, 1788.)

A slender, erect, densely caespitose grass, 2 to 4 dm. high, with rather long, linear leaves and open panicles 5 to 8 cm. long. Culms simple or branching near the base, glabrous, sheaths glabrous or pilose, with rather long (3 mm.) spreading hairs; ligule a dense fringe of hairs; leaf-blades 5 to 15 cm. long, about 4 mm. wide, very acute, scabrous on both sides and occasionally sparingly pilose. Panicle-branches solitary or in pairs, more or less spreading, often flexuous, scabrous. Spikelets obovate or oblong, obtuse, 2 to 2.5 mm. long; first glume nerveless, pilose at least near the base, broadly obtuse, clasping the base of the spikelet, about 0.5 mm. long; second and third glumes as long as the spikelet, oblong, obtuse, 7-nerved, sparingly pilose; the third with a palea about half its length; flowering glume 2 mm. long, obtuse.

General distribution: in dry soil, Maine to Missouri, southward to Texas. June–August.

Maine: Orono, dry woods, *M. L. Fernald*, July, 1890 and dry, wooded slope, 506 *M. L. Fernald*, July 14, 1890; North Berwick, *M. L. Fernald*, June 13, 1896. New Hampshire: Windham, Corbett's Pond, *C. W. Swan*, July 9, 1890. Vermont: Burlington, *L. R. Jones*, July 25, 1892; Moncton, *C. G. Pringle*, 1878; Manchester, 284 *M. A. Day*, June 21, 1898. Massachusetts: West Quincy, *J. R. Churchill*, July 4, 1891; Ashburnham, *Sydney Harris*, June 12, 1896; Melrose, rocky bank of Cascade, *W. P. Rich*, June 16, 1895; Andover, J. Blake, July 21, 1882 and June 21, 1884; Boston, *C. W. Swan*, Jûne 25, 1881. Connecticut: New Haven, *J. A. Allen*, June 14, 1877; Southington, *C. H. Bissell*, June 17, 1897.

This species is similar in habit and is very closely related to *Panicum depauperatum* from which it is at once distinguished by its smaller and more obtuse spikelets. In *Panicum depauperatum* the spikelets are about 3.5 mm. long and the second and third glumes are decidedly longer than the flowering glume and more prominently nerved, the first glume being distinctly 1- and occasionally 3-nerved, the second usually 9-nerved. When dry the spikelets in *P. depauperatum* have the appearance of being slightly beaked, while in *P. linearifolium* they are distinctly obtuse.

* * Leaves usually spreading, extremely variable, lanceolate or linear lanceolate, rounded, truncate or clasping at the base.

† Panicles strict, narrow, the branches erect.

15. Panicum xanthophysum A. Gray, Ann. Lyc. N. Y. **3**: 234. 1835; Gram. & Cyp. **1**: no. 28. (*Panicum calliphyllum* Ashe, Journ. E. Mitch. Sci. Soc. **15**: 31. 1898.) — A rigid erect, light green

or somewhat yellowish perennial, 1.5–6 dm. high, with simple culms, erect, lanceolate leaves and few-flowered contracted panicles 5–10 cm. long. Culms glabrous, branching at the base; nodes smooth; sheaths striate, sparingly pilose-pubescent or nearly smooth, shorter than, or sometimes exceeding the internodes: ligule very short; leaf blades 4–15 cm. long, 6–20 mm. wide, erect, rounded and somewhat clasping at the base, acute or acuminate, strongly nerved, nearly smooth, except on the strongly serrulate-scabrous margins, sometimes ciliate at the base. Panicle subsimple, exserted, its branches appressed, nearly smooth. Spikelets obovoid, obtuse, about 3 mm. long, first glume 3-nerved, lanceolate, about one-half as long as the nearly equal second and third glumes which are 9-nerved and sparingly pubescent or rarely nearly glabrous; flowering glume smooth and shining.

General distribution: in dry soil, Quebec to Pennsylvania, west to Minnesota and Manitoba. June to August.

MAINE: Rumford, *J. C. Parlin*, 1889; Orono, gravelly soil, *M. L. Fernald*, July 14, 1890, open sandy soil, 345 *M. L. Fernald*, July 26, 1895, and sandy river thicket, *M. L. Fernald*, July 12, 1897; Madison, sandy woods, 521 *M. L. Fernald*, 1892; North Berwick, *J. C. Parlin*, July 5, 1891; South Berwick, 519 *J. C. Parlin & M. L. Fernald*, June 13–14, 1896; Mechanic Falls, *J. A. Allen*, July 11, 1897; Harrison, *J. Blake*, July 1884; York, dry woods, *M. L. Fernald*, July 17, 1891; Buckfield, *J. A. Allen*, July 1, 1878; Wells, *Kate Furbish*, 1879; Gilead, gravelly soil, *Kate Furbish*, July, 1897; East Auburn, *E. D. Merrill*, July, 1898. NEW HAMPSHIRE: Upper Gilmantown, *J. Blake*, July 1, 1869; Shelburn, dry woods, *W. Deane*, Aug. 8, 1883 and July 25, 1884. VERMONT: Burlington, sandy open woods, *L. R. Jones*, July 20, 1893 and June 28, 1896; Snake Mt., Addison, *L. R. Jones*, July 1, 1898; Vernon, *A. J. Grout*, Aug. 2, 1895. MASSACHUSETTS: Amherst, *H. G. Jesup*, July, 1874; Ashburnham, *S. Harris*, July 12, 1896; Springfield, *W. H. Chapin*, June 25, 1885.

PANICUM XANTHOPHYSUM forma AMPLIFOLIUM Scribn. in Fl. Vt. 104. 1900.—Culms stout; lower sheaths crowded, strongly striate and papillate-hirsute, blades firm, 10–20 mm. wide. Dry sandy soil, Burlington, Vt., *Prof. L. R. Jones* collector, August 31, 1893.

† † Panicles ovate, open, the branches spreading.

‡ Leaf-blades ample, 2 to 3 cm. broad, cordate and clasping at the base.

§ Sheaths papillose-hispid.

16. PANICUM CLANDESTINUM Linn. Sp. Pl. 58. 1753. (*Panicum pedunculatum* Torr. Fl. U. S. 141. 1824; *Panicum clandestinum pedunculatum* A. Gray, Man. Bot. 613. 1848; *Panicum decoloratum* Nash. Bull. Torr. Bot. Club, **26**: 570. 1899.)—A rather stout, ascend-

ing or erect, and finally much branched perennial 9–12 dm. high, with usually very rough hispid sheaths and broad leaves. Culms glabrous, at first simple, becoming much branched later in the season; nodes smooth. Sheaths shorter than, or often exceeding the internodes, much crowded on the branches, rough tuberculate-hispid, rather soft pubescent, or sometimes nearly smooth, ciliate-pubescent on the margins: ligule very short; leaf-blades broadly lanceolate, 8–20 cm. long, 15–30 mm. wide, cordate-clasping at the base, acuminate, usually smooth on both sides or the lower ones sometimes somewhat pubescent beneath, serrulate scabrous on the cartilaginous margins and often ciliate near the base. Panicle diffuse, that of the primary stem 8–15 cm. long and finally exserted, those of the branches partly or wholly concealed within the leaf sheaths; rachis striate, slightly scabrous; branches decompound to the base, alternate, scabrous as are also the pedicels which for the most part are longer than the spikelets. Spikelets obovate, elliptical, 2.5–3 mm. long, smooth or thinly pilose; first glume about one-half as long as the nearly equal nine-nerved second and third glumes, the latter with a palea in its axil; flowering glume minutely pubescent at the apex, otherwise smooth. Leaves on the branches shorter and more crowded and the sheaths more rough hairy than on the primary stem. The primary, terminal exserted panicle disappears after the development of the lateral branches.

General distribution: Along banks of streams and rivers and in low thickets, Quebec to Michigan, south to Georgia, Missouri, and Texas. May to September.

Maine: Foxcroft, gravelly thicket, 292 *M. L. Fernald*, July 17, 1895; and 518 *M. L. Fernald*, July 29, 1894; Gilead, thickets, *Kate Furbish*, July, 1897; Livermore Falls, *Kate Furbish* (no date); Farmington, *C. H. Knowlton* (no date); Eddington, river thicket, *M. L. Fernald*, Sept. 16, 1897; Rumford, *J. C. Parlin*, Aug. 1889; Mattawamkeag, river thicket, 2814 *M. L. Fernald*, Sept. 14, 1898; Harrison, *J. Blake*, Sept. 1869. New Hampshire: East Jaffrey, roadsides, 335, *B. L. Robinson*, July 19, 1897; Lebanon, *G. G. Kennedy*, June 27, 1896; Shelburne, *W. Deane*, Aug. 31, 1884. Vermont: Brattleboro, 86 *B. L. Robinson*, Aug. 2, 1898. Massachusetts: Cotuit, *W. P. Rich*, July 18, 1890; Border of Saugus River, *W. P. Rich*, Aug. 4, 1889; Milton, border of Neponset River, *J. R. Churchill*, Aug. 23, 1885; Montague, *J. R. Churchill*, July 28, 1887; Hyannis, *J. R. Churchill*, July 4, 1886; Cambridge, *H. Mann* (no date); Ashland, *W. Deane*, July 3, 1884; Framingham, *E. C. Smith*, July, 1897; South Framingham, *E. L. Sturtevant*, July 6, 1890; Nonquit, *E. L. Sturtevant*, July 12, 1888 and July 5, 1889; Wilmington, *F. S. Collins*, June 25, 1887; Lowell, *C. W. Swan*, June 19, 1882 and Aug. 3, 1880; Watertown, *C. W. Swan* July 20, 1888; East Gloucester, Niles Farm, *C. W. Swan*, Aug. 12, 1882. Rhode Island: East Providence,

J. F. Collins, Aug. 26, 1893. CONNECTICUT: New Haven, *J. A. Allen*, Aug. 5, 1879; Southington, *L. Andrews*, June 29, 1898.

§ § Sheaths smooth or soft pubescent.

17. PANICUM MACROCARPON Le Conte in Torr. Cat. Pl. N. Y. 91. 1819. — A rather stout, glabrous perennial 3–10 dm. high with broad, lanceolate leaves, glabrous sheaths and few-flowered, open panicles 5–15 cm. long. Culms glabrous, more or less branched above; nodes smooth or the lower ones rarely slightly bearded. Sheaths shorter than the internodes, striate, smooth or rarely sparingly pubescent, generally somewhat ciliate on the margins; ligule very short; leaf-blades 5–17 cm. long, 2–4 cm. wide, cordate clasping at the base, long-acuminate, glabrous on both sides or with few scattered strigose hairs, usually ciliate on the serrulate-scabrous margins, especially near the base. Panicle exserted or often somewhat enclosed in the upper sheath; rachis glabrous; branches alternate, decompound, glabrous, spreading-erect. Spikelets 3–3.4 mm. long, oval to obovate; first glume one-third to one-half as long as the spikelet, acute or obtuse; second and third glumes pubescent, turgid, 9–11-nerved; flowering glumes 2.5–3 mm. long minutely pubescent at the apex.

General distribution: Dry rocky woods, thickets, etc., Maine and Ontario to the District of Columbia, west to Wisconsin and Iowa. June to September.

MAINE: Orono, rocky open woods, 346 *M. L. Fernald*, July 26, 1895 and Aug. 2, 1889; Madison, dry woods, *M. L. Fernald*, Aug. 1, 1892; North and South Berwick, *M. L. Fernald & J. C. Parlin*, June 13–14, 1896; East Auburn, *E. D. Merrill*, Aug. 1898; North Berwick, *J. C. Parlin*, July 17, 1891; Woodstock, *J. C. Parlin*, 1887. VERMONT: Manchester, 216 *M. A. Day*, June 29, 1898; MASSACHUSETTS: Mt. Wachusett, woods, *J. F. Collins*, July 14, 1893; Framingham, 613 *E. C. Smith*, July 8, 1892; *E. C. Smith*, July 1897; South Framingham, *E. L. Sturtevant*, July 6, 1890; Nonquit, *E. L. Sturtevant*, June 18, 1889; Revere, Oak Island, *H. A. Young*, July 7, 1878 and June 25, 1892, also *W. P. Rich*, July 5, 1891; Winchester, *C. E. Perkins*, June 19, 1893; Mt. Holyoke, *J. Blake*, June, 1858; Andover, *J. Blake*, July, 1882; Dorchester, *J. R. Churchill*, July 1, 1882; West Quincy, *J. R. Churchill*, June 29, 1888; Ashland, *W. Deane*, July 3, 1884; Rockport, Pigeon Cove, *C. W. Swan*, July 15, 1881; Lowell, moist thickets, *C. W. Swan*, July 28, 1859; Blue Hills, *W. H. Manning*, Aug. 11, 1894; Middlesex Fells, *W. H. Manning*, Aug. 4, 1894; Stony Brook Reservation, Metropolitan Park, *G. L. Chandler*, June 17, 1895. CONNECTICUT: Waterford, dry sandy woods, Fog Plain, 89 *C. B. Graves*, July 5, 1898.

18. PANICUM LATIFOLIUM Linn. Sp. Pl. 73. 1753 (excluding reference to Sloane). (*Panicum latifolium* Walt. Fl. Car. 73. 1788;

P. walteri Poir. Lam. Encycl. Suppl. **4**: 282. 1816, not Pursh, 1814; *P. latifolium molle* Vasey, U. S. Dept. Agr. Div. Bot. Bul. **8**: 34. 1889; *P. porterianum* Nash, Bul. Torr. Bot. Club, **22**: 420: 1895; *P. pubifolium* Nash, ibid. **26**: 577. 1899). — A rather slender, densely pubescent or rarely nearly glabrous, tufted perennial 3–7 dm. high, with broad, ovate, or lanceolate leaves, and rather large spikelets in few-flowered, open panicles. Culms finally much branched above, glabrous or pubescent; nodes densely bearded with long reflexed hairs. Sheaths shorter than the internodes pubescent with long spreading hairs, also with a dense ring of hairs at the apex, or rarely nearly glabrous; ligule very short; leaf-blades 7–11 cm. long, 2–3 cm. wide, acute or acuminate, gradually narrowed to the rounded, cordate-clasping base, serrulate-scabrous on the margins, sparingly strigose-pubescent on the upper surface, pubescent with short, soft hairs on the lower surface or sometimes nearly glabrous. Panicle 3–11 cm. long, exserted or sometimes partly included in the upper sheath; rachis more or less densely pubescent with soft spreading hairs, or glabrous; branches alternate, glabrous or pubescent. Spikelets 4–5 mm. long, narrowly obovate, pubescent with long spreading hairs; first glume 3-nerved, about one-half as long as the spikelet, obtuse or acute; second glume 11-nerved, a little shorter than the third glume which subtends a hyaline palea nearly its own length; flowering glume about 3.5 mm. long, pubescent at the obtuse apex.

General distribution: In open woodlands and thickets, Massachusetts to Illinois, south to Florida and Texas. June to October.

MASSACHUSETTS: West Quincy, *J. R. Churchill*, July 9, 1894. CONNECTICUT: New Haven, *J. A. Allen*, July 14, 1879; Ledyard, Decatur Hill, 78 *C. B. Graves*.

‡ ‡ Leaves less than 2 cm. broad, not cordate-clasping.

§ Spikelets 3 mm. long; whole plant very firm in texture.

19. PANICUM SCRIBNERIANUM Nash, Bul. Torr. Bot. Club, **22**: 421, 1895. (*Panicum pauciflorum* of A. Gray, Man. Bot. 613, 1848, not Ell. 1817; *Panicum scoparium* of S. Wats in A. Gray, Man. Bot. ed. 6, 632. 1890, not Lam. 1797; *Panicum scoparium minor* Scribn. Tenn. Agr. Exp. Sta. Bul. 7^2: 48. 1894, not *Panicum capillare minor* Muhl. 1817.)

An erect and finally branching perennial, 1.5 to 6 dm. high, with usually palpillate-pilose sheaths, more or less spreading flat leaves, which are smooth above, and ovoid panicles, 4 to 8 cm. long. Sheaths shorter than the internodes; ligule a short ciliate fringe; leaf-blades firm, lanceolate 5 to 10 cm. long, 6 to 12 mm. wide, acuminate, somewhat clasping at the rounded or truncate base, more or less spreading, scabrous on the margins and on the lower surface which is sometimes pubescent. Panicles open, few-flowered,

the primary one exserted, its branches spreading often flexuous, the secondary ones much smaller and more or less included. Spikelets obovoid, 3 mm. long, obtuse; first glume triangular, about one-third as long as the spikelet or less; second and third glumes equal, 7 to 9-nerved, pubescent with rather short spreading hairs.

General distribution: in dry or moist soil, Maine and Ontario to Washington south to Alabama, Kansas, and Arizona. June to August.

MAINE: South Berwick, *M. L. Fernald*, Sept. 26, 1897; dry open woods, 996 *J. C. Parlin*, Sept., 1897; York, *M. L. Fernald*, July 15, 1891. VERMONT: Westminster, *B. L. Robinson*, June 16, 1898; Brattleboro, *A. J. Grout*, July 8, 1895. MASSACHUSETTS: Wellesley, on a railroad embankment, 731 *E. C. Smith*; Needham, dry sterile fields, *T. O. Fuller*, June 22, 1890; Reading, *C. E. Perkins*, June 4, 1883; Revere, gravelly ground, *W. P. Rich*, June 10, 1899; Wilmington, *W. P. Rich* June 11, 1899; Wakefield, *F. S. Collins*, June 12, 1887; Ipswich, sub. nom. *Panicum dichotomum* var. *nitidum* in Herb. Oakes; Canton *E.* & *C. E. Faxon*, June 4, 1880; Mt. Holyoke, *J. Blake*, June, 1858; Brookline, *C. W. Swan*, June 22, 1881; Roxbury, *C. W. Swan*, July 23, 1882; Waltham, *W. Deane*, June 22, 1884; Nantucket, *W. Deane*, July 11, 1884.

§ § Spikelets less than 3 mm. in length: plants usually rather soft in texture.

= Whole plant smooth or nearly so.

|| Nodes bearded.

20. PANICUM BARBULATUM Michx. Fl. Bor. Am. **1**: 49. 1803. (*Panicum discolor* Spreng. Mant. Fl. Hal. 31. 1807 — Muhl. Gram. 114. 1817: *P. heterophyllum* Muhl. Trans. Am. Phil. Soc. **3**: 160. 1793, nomen nudum: *P. heterophyllum* Schreb. in Muhl. Gram. 115. 1817, as synonym; *P. heterophyllum* Bosc. in Nees, Agrost. Bras. 227, 1829; *P. microcarpon* Muhl. in Ell. Sk. Bot. S. C. and Ga. **1**: 127, Jan. 1817, not Muhl. Gram. 111. June, 1817: *P. nitidum barbatum* Torr. Fl. U. S. **1**: 146. 1824; *P. dichotomum barbulatum* A. Gray, Man. Bot. 580. 1848; *P. pubescens barbulatum* Britt. Cat. Pl. N. J. 280. 1889.)— An erect or ascending, nearly glabrous perennial, 4–9 dm. high, with strongly barbed nodes and small glabrous spikelets. Culms at first simple, erect, later profusely branched throughout, becoming prostrate or leaning; nodes strongly retrorsely barbed. Sheaths shorter than the internodes, rather loose, glabrous except on the usually ciliate margins and often slightly bearded apex, those of the primary stem often irregularly marked with white spots; ligule a short ciliate ring or nearly obsolete; leaf-blades glabrous, those of the primary stem lanceolate, acute, narrowed to the truncate or rounded base, 8–14 cm. long, 8–12 mm. wide, spreading, the lower ones usually reflexed, those of the slender branches much smaller,

crowded, 2 to 5 cm. long, 2 to 4 mm. wide. Primary panicle exserted, 8–12 cm. long, ovoid, its capillary branches ascending, the lower ones 6–8 cm. long; secondary panicles much smaller, lax, few-flowered, 3–4 cm. long. Spikelets ovate, acute or obtuse, 1.5 mm. long, on elongated, capillary, sparingly scabrous pedicels; first glume about one-third as long as the spikelet, acute; second and third glumes green or purplish, glabrous or sometimes pubescent, faintly 7-nerved.

General distribution: in damp soils, thickets, etc. Massachusetts, Ohio, Illinois, and Missouri, south to Florida and Texas. May to September.

Massachusetts: Nonquit, woods, 36 *E. L. Sturtevant*, Aug. 24, 1888, July 19, 1889, and August 4, 1889; Dartmouth, *E. L. Sturtevant*, Sept. 15, 1899; West Quincy, Blue Hills, *J. R. Churchill*, July 11, 1891; Blue Hills, *W. H. Manning*, August 11, 1894. Rhode Island: Providence, swamp, *J. F. Collins*, June 27, 1891. Connecticut: Hartford, frequent, 4 *A. W. Driggs*, July 27, 1900.

21. Panicum mattamusketense Ashe, Journ. E. Mitch. Sci. Soc. **15**: 45. 1898. (*Panicum discolor* var. *major* Muhl. Gram. 115. 1817, not *Panicum nitidum* var. *majus* Pursh, Fl. Am. Sept. **1**: 67. 1814). An erect, rather stout, somewhat tufted perennial, 6–12 dm. high, with rather thin, glabrous, lanceolate leaves, and pubescent spikelets. Culms glabrous, erect, simple or slightly branched below; nodes strongly bearded. Sheaths much shorter than the internodes, glabrous, or the lower one sparingly pilose, ciliate on the margins; ligule a short ciliate fringe; leaf-blades spreading, scabrous on the margins, otherwise smooth, 8–14 cm. long, 8–14 mm. wide, acuminate somewhat narrowed to the slightly clasping base, pubescent on the back where it joins the sheath. Panicle exserted, ovoid, 8–14 cm. long, branches fasciculate, spreading or ascending, the lower ones often flexuous. Spikelets ovate, often purplish, about 2.2 mm. long, first glume acute, about one-fourth as long as the spikelet; second and third glumes pubescent with scattered spreading hairs.

General distribution: In damp open woods, Massachusetts, North Carolina and Georgia, June to July.

Massachusetts: Wellesley, *W. P. Rich*, June 14, 1899.

|| || Nodes naked or with only a few spreading hairs.

× Spikelets glabrous.

22. Panicum dichotomum Linn. Sp. Pl. 58. 1753? (*Panicum dichotomum viride* Vasey, U. S. Dept. Agr. Div. Bot. Bul. **8**: 30. 1889; *Panicum ramulosum viride* Porter, Bul. Torr. Bot. Club, **20**: 194. 1893.) — A slender, glabrous, somewhat wiry perennial, 2 to 6 dm. high, finally much branched above, with pale green spreading leaves and open panicles. Culms erect, slender, often purple; nodes smooth or with few long, weak hairs. Sheaths shorter than the internodes, smooth; ligule a short ciliate ring; leaf-blades thin, gla-

brous, spreading, linear-lanceolate, acuminate, gradually narrowing to the base, 3 to 8 cm. long, 2 to 6 mm. wide. Panicles ovate 4 to 8 cm. long, the branches slender, spreading, few-flowered, the lower ones often 5 or 6 cm. long; secondary panicles numerous, small, few-flowered. Spikelets oblong elliptical, nearly 2 mm. in length, glabrous, first glume very small, one-fourth as long as the spikelet or less; second and third glumes equal, green or purplish.

General distribution: in dry woodlands and thickets, Maine to Kentucky and Missouri, south to Texas, June to August.

Maine: Orono, *F. P. Briggs*, Aug. 1890; Bridgton, *J. Blake*, July 23, 1856. Vermont: Burlington, *L. R. Jones*, June 25, 1892; West Rutland, Twin Mountains, 1759 *W. W. Eggleston*, July 1, 1899. Massachusetts: Melrose, 289 *W. P. Rich*, July 4, 1894, 193 *W. P. Rich*, June 18, 1894; Cascade region, *W. P. Rich*, July 3, 1892, 193 *W. P. Rich*, July 1894; Blue Hills, *L. R. Jones*, Aug. 24, 1898; Malden, *W. P. Rich*, July 29, 1888 and July 16, 1895; Wellesley, *W. P. Rich*, June 14, 1899; Framingham, shady woods, *W. Deane*, July 3, 1884, also 753 *E. C. Smith*, Aug. 28, 1899 and Sept. 1897; Nonquit, 58, *E. L. Sturtevant*, June 14, 1889, and July 5, 1889; Dartmouth, 68 *E. L. Sturtevant*, July 31, 1889. Lowell, *C. W. Swan*, July 29, 1882; Middlesex Fells, Bear's den Road, *F. S. Collins*, July 4, 1887; West Quincy, *J. R. Churchill*, July 11, 1891; West Falmouth, *J. R. Churchill*, July 2, 1894; Andover, *J. Blake*, June 21, 1880; Mattapan, *J. R. Churchill*, June 21, 1890. Connecticut: New Haven, *J. A. Allen*, July 14, 1877; Fairfield, sandy dry soil, *E. H. Eames*, July 24, 1893.

+ + Spikelets pubescent.

× Spikelets ovate or elliptical; ligule present.

¶ Lower internodes puberulent.

23. Panicum bicknellii Nash, Bul. Torr. Bot. Club, **24**: 193. 1897.—An erect or ascending, nearly glabrous perennial, 2 to 4 dm. high, with erect or ascending leaves and few-flowered ovate panicles 6 to 8 cm. long. Culms slender, at length sparingly branched, the lower internodes puberulent, the nodes sparingly or rather densely bearded. Sheaths generally longer than the internodes, ciliate on the margins; ligule a fringe of very short hairs; leaf-blades linear, acuminate at the apex, narrowed toward the ciliate base, scabrous on the margins, the primary ones 8 to 16 cm. long, 5–10 mm. wide, the uppermost longest. Axis of the panicles scabrous as are also the ascending, slightly flexuous branches. Spikelets obovate, 2.5–3 mm. long; first glume triangular, acute, one-fourth as long as the spikelet: second and third glumes 7-nerved, pubescent with short spreading hairs.

General distribution: in dry rocky woods, Connecticut to Pennsylvania, July to August.

Connecticut: Norwich, rocky woods. Lamb's Hill, 15 *C. B. Graves*, July 1, 1899.

The puberulent culms and nodes bearded with ascending or appressed hairs, as well as the characters presented by the panicle and spikelets suggest a very close relationship with *Panicum commutatum*, in fact *P. bicknellii* might with some propriety be treated as a narrow-leafed variety of that species.

24. Panicum commutatum R. & S. Syst. **2**: 242. 1817. (*P. nervosum* Muhl. Gram. 117. 1817; *P. ashei* Pearson in Ashe, Journ. E. Mitch. Soc. **15**: 35. 1898.

A more or less caespitose, erect, and finally branching perennial with rather stout culms 3 to 10 dm. high, broad lanceolate leaves, and diffuse panicles. Culms glabrous or puberulent; nodes glabrous or pubescent with erect hairs. Sheaths striate, generally shorter than the leaf-blades, the margins more or less ciliate otherwise glabrous or with a more or less densely pubescent ring on the back at the apex; ligule very short, minutely ciliate; blades more or less cordate-clasping at the base, 5–13 cm. long, less than 1 cm. to nearly 3 cm. broad (usually about 6 cm. long by 1 cm. broad); margins scabrous, ciliate towards the base, surfaces glabrous, long-acuminate pointed. Basal leaves 3–10 cm. long and 1–2 cm. wide, usually nearly as broad as long. Panicles broadly ovate or pyramidal, 5–12 cm. long; branches spreading, more or less flexuous, rather few-flowered, glabrous or nearly so. Spikelets oblong, obtuse, 2.5–3 mm. long; first glume one fourth to one third as long as the second, obtuse, nerveless; second and third glumes pubescent or thinly pilose, 7-nerved, as long as or slightly exceeding the smooth and obtuse fourth glume.

General distribution: Southern New England, and New York southward to Florida and westward to Mississippi and Missouri.

Massachusetts: Melrose, *W. P. Rich*, July 3, 1892, 291 *W. P. Rich*. July 21, 1894, and 235a, June 16, 1895; Boston, rocks near Muddy-pond woods, *C. W. Swan*, June 5, 1894; Blue Hill, *W. H. Manning*, Aug. 23, 1894; Weston, *E. F. Williams*, Sept. 29, 1895; West Quincy, *J. R. Churchill*, Sept. 9, 1894. Connecticut: Montville, 88 *C. B. Graves*, June 19, 1897.

This species varies a good deal in its habit of growth, some forms being slender, others quite robust. The leaves also vary a good deal in width, but in all they are many-nerved and glabrous except as above indicated. The sheaths are nearly always glabrous, but in a few southern forms the upper portion of the sheath is somewhat pilose with appressed hairs. The ring of pubescence at the summit of the sheath on the back is quite characteristic of this species. In the type the culms are glabrous as are the nodes, but in the form which extends into New England ranging southward to Tennessee and Florida the culms, at least the lower internodes, are puberulent,

and the nodes often quite densely pubescent with erect, appressed hairs. As pointed out by Elliott this species has some resemblance to *Panicum latifolium* L., but it is usually taller, its leaves narrower and less cordate at the base, and panicle larger with more numerous and much smaller spikelets which do not form regular racemes on the lower branches. *Panicum ashei* Pearson (*P. commutatum minor* Vasey), is based upon a reduced and late, branching form of this species. The specimens from Montville, Conn., No. 88 C. B. Graves in National Herbarium are exactly matched by specimens from Virginia and from Tennessee.

¶ ¶ Culms smooth throughout.

25. Panicum boreale Nash, Bul. Torr. Bot. Club, **22**: 421. 1895. — An erect, finally branching, glabrous perennial 3–6 dm. high with lanceolate, pale green leaves and open, spreading panicles 4–10 cm. long. Culms smooth, often geniculate below; nodes glabrous; sheaths shorter than the internodes, glabrous, somewhat ciliate on the margin; ligule short, ciliate; leaf-blades 5–13 cm. long, 8–15 mm. wide, rather thin, erect, glabrous, truncate or rounded at the sparsely ciliate base, acuminate. Panicle ovate, its branches 2–5 cm. long, spreading or ascending. Spikelets 2 mm. long, elliptical, about equaling their pedicels; first glume ovate, obtuse, about one-third as long as the spikelet; second and third glumes seven-nerved, slightly pubescent with short spreading hairs; flowering glume oval-acute, about 1.5 mm. long.

General distribution: moist soil, low thickets and bogs, Newfoundland and Ontario to Connecticut, New York, Michigan, and Minnesota, June to August.

Maine: Dover, 514 *M. L. Fernald*, June 28, 1894, and in gravelly thicket, 239 *M. L. Fernald*, June 26, 1895, Orono, *M. L. Fernald*, July 4, 1890, thickets, *M. L. Fernald*, June 30, 1892, low ground, *M. L. Fernald*, July 5, 1892, 516 *M. L. Fernald*, June 30, 1893, sandy river thicket, *M. L. Fernald*, July 12, 1897, *F. P. Briggs*, Aug. 1890; East Auburn, *E. D. Merrill*, July, 1898; Cumberland, *J. Blake*, July 3, 1857; Wells, *J. Blake*, June 21, 1884; Somesville, Mt. Desert, *Rand & Redfield*, June 17, 1889 (*Panicum laxiflorum* of the Flora of Mt. Desert Island); North Berwick, *J. C. Parlin*, July 17, 1891, and again in 1894; Fort Fairfield, rocky river bank, *M. L. Fernald*, July 4, 1893, *Kate Furbish*, 1881; Foxcroft, cedar swamp, 515 *M. L. Fernald*, June 25, 1890: St. Francis, *M. L. Fernald*, Aug. 5, 1893; Denmark, *W. H. Merrill*, 1894; Old Orchard, peat bog, *M. L. Fernald*, July 11, 1896, a robust form which suggests *Panicum clutei* Nash.; Manchester, *F. Lamson-Scribner*, 1895. New Hampshire: Whitefield, *W. Deane*, July 3, 1896; Shelburne, wet sand, *W. Deane*, July 31, 1884; Tamworth Iron Works, *C. W. Swan*, Aug. 5, 1888; North Groton, *J. Blake*

July, 1879; Jaffrey, dry sandy soil in woods, 338 *B. L. Robinson*, July 5, 1897, also in sphagnum bog, 338a *B. L. Robinson*, July 10, 1897. Vermont: Sterling Mountain, *W. W. Eggleston*, Aug. 1, 1893; Middlebury, low clay meadow, *Ezra Brainerd*, June 26, 1899; New Haven Junction, moist meadow, 17 *Ezra Brainerd*, June 25, 1897; Newfane, on river banks, *A. J. Grout*, July 2, 1895; Brattleboro, *L. R. Jones*, July 4, 1895; Charlotte, *C. G. Pringle*, July 5, 1880, a robust form with purplish panicles and narrower leaves than in the type. Massachusetts: Sharon, meadows, *W. P. Rich*, June 17, 1896; Framingham, on gravelly banks, 732, 733 *E. C. Smith*, June 23, 1899, June 25, 1897, and June 17, 1899; Billerica, *C. W. Jenks & C. W. Swan*, Aug. 18, 1889; Wilmington, *F. S. Collins & C. W. Swan*, July 25, 1887, an unusually robust form; Revere, Oak Island, *H. A. Young*, July 2, 1882, also *W. P. Rich*, July 9, 1899. Connecticut: Griswold, shaded tussocks, edge of cedar swamp near Jewett City, 77 *C. B. Graves*, June 16, 1899; Waterford, wet spagnous meadows, Fog Plain, 82 *C. B. Graves*, Aug. 6, 1897.

26. Panicum werneri Scribn. in Britt. & Brown Illus. Flora **3**: 501. 1898.

A slender, erect, caespitose perennial 2–4 dm. high with narrowly lanceolate, very acute leaves and diffuse, ovoid or pyramidal panicles 5–7 cm. long. Culms simple or sparingly branched below, glabrous; nodes glabrous or sparingly pilose with rather long, spreading hairs. Sheaths glabrous, striate, sometimes ciliate on the margins near the apex. Ligule a dense fringe of hairs about 1 mm. long. Blades 5–14 cm. long 4–6 mm. wide, scabrous on the margins and upper surface, glabrous beneath, ciliate with a few long hairs near the abruptly contracted base. Panicle branches flexuous, spreading, glabrous, the lowermost 3–4 cm. long. Spikelets oblong, ovoid, obtuse, 2 mm. long; first glume about one-fourth the length of the spikelet, broadly rounded-obtuse, nerveless; second and third glumes 7-nerved, thinly pubescent with very short hairs.

General distribution: Southern New England to Ohio.

Connecticut: Ledyard, gravelly soil of kames, near Stoddard's wharf, 16 *C. B. Graves*, June 27, 1899: Voluntown, dry sandy soil in rather open woods, 17 *C. B. Graves*, July 5, 1899.

This species may be readily distinguished from *P. linearifolium* by its more remote culm leaves which are abruptly rounded near the base and do not taper from near the middle downwards. The panicle is finally much exserted beyond the uppermost leaf and the panicle branches and pedicels are glabrous. In *P. linearifolium* the panicle branches and pedicels are conspicuously scabrous and the pedicels are less spreading. This species differs from *P. bicknellii* in its glabrous culms, rather more remote leaves, smaller spikelets and glabrous panicle branches.

27. Panicum nitidum Lam. Tabl. Encycl. **1**: 172. 1791; Encycl.

4: 738 (err. typ. 748.) 1797. (*Panicum* — Muhl. Descr. 125. 1817 number 37 (sine nomine); *Panicum spretum* Schult. Mant. **2**: 248. 1824; *Panicum nitidum* forma *densiflorum* Scribn. in Rand & Redfield, Fl. Mt. Desert Isl. 174. 1894; *Panicum eatoni* Nash Bul. Torr. Bot. Club, **25**: 814. 1898; *Panicum paucipilum* Nash, ibid., **26**: 573. 1899.)

A glabrous, tufted perennial 6 to 10 dm. high, with erect, narrowly lanceolate leaves, and exserted, contracted panicles, bearing numerous, small, purplish, pubescent spikelets. Culms at first simple, becoming dichotomously branched, generally purplish; nodes smooth; sheaths much shorter than the internodes, glabrous, striate, usually slightly ciliate on the margins above; ligule a dense ring of hairs about 2 mm. long; leaf-blades 5 to 10 cm. long, 3 to 10 mm. wide, acuminate, glabrous, or with few papillate hairs at the base. Panicle finally long-exserted, generally contracted, 5 to 13 cm. long; rachis glabrous; branches erect or ascending. Spikelets ovate, 1.4 to 1.6 mm. long; first glume small, one-fourth to one-third as long as the spikelet, glabrous, 1-nerved; second and third glumes pubescent with spreading hairs, often densely so, 7-nerved; flowering glume about 1.3 mm. long.

General distribution: In wet or damp soil, especially near the coast, Maine to Indiana, south Mississippi and Texas. For discussion of this species see Scribn. & Merrill, U. S. Dept. Agr. Div. Agros. Bul. **24**: 31. 1901.

Maine: Mt. Desert, shore of Ripples Pond, *E. L. Rand*; York, shore of Chase's Pond, 510 *M. L. Fernald*, July 16, 1891. Massachusetts: Stoneham, meadow, border of Spot Pond, 336 *W. P. Rich*, July 4, 1894, gravelly path, border of Doleful Pond, 320 *W. P. Rich*, July 4, 1894, meadows, west border of North Reservoir, 349 *W. P. Rich*, July 7, 1894; Wilmington, damp sandy ground in a cranberry bog, *W. P. Rich*, July 18, 1899; Holbrook, wet meadows, *W. P. Rich*, June 18, 1899; Lynn, border of pond, *W. P. Rich*, Aug. 25, 1889; West Roxbury, *W. P. Rich*, Aug. 27, 1880; West Quincy, meadow, *W. P. Rich*, Sept. 3, 1894; South Framingham, *E. L. Sturtevant*, July 3, 1890 and July 6, 1890; Nonquit, 54 *E. L. Sturtevant*, June 26, 1889; Westford, Nebasset Pond, *C. W. Swan*, July 7, 1880; Wakefield, *J. R. Churchill*, July 22, 1886; Milton, brook above Thatcher St., *J. R. Churchill*, July 10, 1892; Concord, low open fields, *W. Deane*, July 6, 1886. Rhode Island: Johnson, *J. W. Congdon*, Sept. 27, 1871. Connecticut: Waterford, wet meadows near Miner's Lane, 87 *C. B. Graves*, July 15, 1898, open damp ground, *C. B. Graves*, 1895; Franklin, *C. B. Graves*, July 3, 1899.

28. Panicum clutei Nash, Bul. Torr. Bot. Club, **26**: 569. 1899.— A tufted, glabrous perennial 6–9 dm. high, with ascending, lanceolate leaves and exserted, ovate, panicles 6–10 cm. long. Culms rather

stout, simple or becoming somewhat branched; nodes smooth, or the lower ones very slightly bearded; sheaths rather loose, minutely pubescent at the apex, usually more or less ciliate on the margin, the basal ones somewhat pubescent; ligule a dense ring of hairs about 0.3 mm. long; leaf-blades firm, smooth on both surfaces, serrulate-scabrous on the margins, 7–14 cm. long, 7–12 mm. wide, the basal ones much shorter. Panicle-purplish, its ascending branches smooth. Spikelets ovate, acute, about 2.3 mm. long; first glume broadly ovate, obtuse or acute, 1-nerved, glabrous or nearly so; second and third glumes finely and sparingly pubescent with short hairs, 9-nerved; flowering glume ovate, about 2 mm. long.

General distribution: In dry, sandy soil, Massachusetts, New Jersey, July to August.

Massachusetts: Nantucket, *J. R. Churchill*, July 6, 1886, also *C. W. Swan*, July, 1886; West Falmouth, *J. R. Churchill*, June 28, 1894 (not typical).

This very distinct species was described from specimens collected in New Jersey, The above are the only localities known for this species outside of the states of Delaware and New Jersey.

× × Spikelets spherical; ligule obsolete.

29. Panicum sphaerocarpon Ell. Sk. Bot. S. C. and Ga. **1**: 125. 1817. (*P. microcarpon sphaerocarpon* Beal, Grasses N. A. **2**: 137. 1896).—A tufted, erect, or ascending, rather rigid perennial 2–6 dm. high, with firm, erect, leaves and diffuse, many-flowered panicles. Culms simple or finally much branched near the base, smooth; nodes generally bearded with short, ascending hairs, rarely smooth; sheaths usually shorter than the internodes, sometimes exceeding them, glabrous except on the ciliate margin; ligule obsolete; leaf-blades 5–10 cm. long; 5–15 mm. wide, cordate-clasping at the base, very acute, glabrous beneath, scabrous above and on the cartilaginous margins which are usually sparingly ciliate below; basal leaves broadly ovate, 1–3 cm. long, many-nerved. Panicle ovoid or pyramidal, 5 to 8 or rarely 10 cm. long; branches slender, compound to the base; pedicels usually much exceeding the spikelets. Spikelets nearly spherical, purplish, 1.5 to 1.8 mm. long; first glume minute; second and third glumes 7 to 9-nerved, minutely pubescent; flowering glume very smooth, obtuse.

General distribution: dry soil, Massachusetts to Southern Ontario and Illinois, south to Florida, Mississippi, and Texas (Mexico). April to October.

Massachusetts: Framingham, *E. L. Sturtevant*, July 6, 1890. *E. C. Smith*, June 21, 1892 and Sept. 1897, also 748, *E. C. Smith*, July 21, 1899; Medford, wet border of South Reservoir, 342, *W. P. Rich*, July 7, 1894, 386 N. E. Bot. Club, July 23, 1894; Stoneham, wet border, north end of South Reservoir, 343 *W. P. Rich*, July 7, 1894; Sharon, *W. P. Rich*, July 12, 1896; Woburn, gravel pit, *E.*

F. Williams, Nov. 20, 1898, also *E. F. Williams, M. L. Fernald*, Nov. 21, 1898; Dorchester, Mattapan, *J. R. Churchill*, Aug. 2, 1884; West Quincy, path to "crag," Blue Hill, *J. R. Churchill*, July 11, 1891. Boston, new land "introduced plant" *C. W. Swan*, Sept. 29, 1886, Back Bay Park, *C. W. Swan*, Sept. 9, 1888; Malden, Middlesex Fells, *F. S. Collins*, July 4, 1887; Nantucket, *C. W. Swan*, July, 1886; Winchester, *C. W. Swan*, July 19, 1890. CONNECTICUT: Waterford, dry, sandy woods, Fog Plain, 85, *C. B. Graves*, July 9, 1898.

= = Whole plant more or less pubescent.

|| Spikelets 2 mm. long.

30. PANICUM ATLANTICUM Nash, Bul. Torr. Bot. Club, **24**: 346. 1897. (*Panicum haemacarpon*, Ashe, Journ. E. Mitch. Sci. Soc. **15**: 55. 1898.)—A slender erect, much-branched perennial, 3 to 5 dm. high, with culm, sheaths, and erect linear lanceolate leaves, papillate. pilose with long, white, spreading hairs. Nodes bearded with spreading hairs, with a naked ring about 1 mm. wide below each node. Sheaths shorter than the internodes; ligule a ring of hairs 2 to 5 mm. long; leaf-blades erect, rigid, thickish, 3 to 10 cm. long, 4 to 7 mm. wide, acuminate, scabrous on the margins. Panicles ovate or orbicular, 4 to 7 cm. long, 3 to 7 cm. wide, its main axis somewhat pilose at the base. Spikelets many on long hispidulous pedicels, obovate, 2 mm. long, obtuse; first glume about one-half as long as the spikelet, ovate, acute; second and third glumes equal, densely pubescent with short spreading hairs.

General distribution: in dry open woods, Massachusetts to Indiana, and Missouri, south to Mississippi, June to August.

MASSACHUSETTS: Boston, Parker Street, *C. W. Swan*, June 19, 1885; Framingham, *E. C. Smith*, June 29, 1898. CONNECTICUT: Franklin, dry wooded hillsides, Ayer's Gap, 14 *C. B. Graves*, July 3, 1899.

|| || Spikelets about 1.5 mm. long.

+ Plants pubescent with spreading white hairs.

31. PANICUM UNCIPHYLLUM Trin. Gram. Pan. 242. 1826. (*Panicum pubescens* of American authors, not of Lamarck).

An erect or ascending, caespitose, at length much branched pubescent perennial, 3 to 8 dm. high, with lanceolate leaves, exserted ovate panicles and pubescent spikelets. Culms pilose with weak hairs; nodes sparingly bearded or smooth; sheaths striate, loose, usually shorter than the internodes, pilose with spreading or ascending hairs; ligule a long-ciliate fringe; leaf-blades ascending, firm or even rigid, acuminate, slightly narrowed at the rounded or truncate base, densely pubescent beneath, with short spreading hairs, smooth above or often with scattered papillate hairs, 4 to 10 cm. long, 5 to 12

mm. wide. Panicles 5 to 10 cm. long, usually purplish, the branches spreading, generally few-flowered. Spikelets elliptical, obtuse, 1.5 mm. long; first glume small, about one-fourth as long as the spikelet; second and third glumes equal, pubescent with spreading hairs.

General distribution: in dry or wet soil, New Brunswick to the Pacific coast and south to Texas. May to September.

Maine: North Berwick, *M. L. Fernald*, Sept. 25, 1897; Southport, moist thicket, *M. L. Fernald*, July 31, 1894; Augusta, *E. C. Smith*, July 22, 1891; Wells Beach, *M. L. Fernald*, July 23, 1898, a robust form; Pushaw Lake "Dollar Island," *Aaron Young, Jr.*, Aug. 1845; Gilead, *Kate Furbish*, July 1897; Wells, *J. Blake*, June, 1858. Vermont: Willoughby Mt., *G. G. Kennedy*, July 11, 1896, *H. Mann* 1862, *E. & C. E. Faxon*, Aug. 11, 1896; Middlebury, clay meadow, *E. Brainerd*, June 26 and July 24, 1899; Beldens Falls, *E. Brainerd*, July 4, 1899; Leicester, Lake Dunmore, *E. Brainerd*, June 22, 1899; New Haven Junction, *E. Brainerd*, June 25, 1897; Hartland, *B. P. Ruggles*, 1897; Charlotte, *C. G. Pringle*, July 5, 1880; Burlington, *L. R. Jones*, 1898, *A. J. Grout*, June 30, 1893. Massachusetts: Mendon, *H. G. Jesup*, July 7, 1870; Waltham, gravelly soil, *W. Deane*, June 22, 1884; West Quincy, *J. R. Churchill*, July 4, 1891; Cambridge, low ground, Fresh Pond, *W. Deane*, Aug. 28, 1883; Framingham, *E. C. Smith*, July 19, 1892, 737 *E. C. Smith*, July 21, 1899; Boston, Back Bay Park, *C. W. Swan*, Sept. 25, 1888; Ipswich, *Oakes*, no date; Hyannis, *J. R. Churchill*, July 4, 1896; Melrose, 235 *W. P. Rich*, June 28, 1894; Medford, 215 *W. P. Rich*, June 23, 1894; Holbrook, *W. P. Rich*, June 18, 1899; Stoneham, 341 *W. P. Rich*, July 7, 1894; Walpole, *W. P. Rich*, June 7, 1896; Revere, Oak Island, *H. A. Young*, June, 23, 1882, *W. P. Rich*, July 4, 1888. Rhode Island: Providence, *J. F. Collins*, June 15, 1891. Connecticut: Groton, 75 *C. B. Graves*, June 19, 1899; Middlebury, *W. M. Shepardson*, June 25, 1896.

Recent examination of the type of *Panicum pubescens* in Lamarck's herbarium, Muséum d' Histoire Naturelle de Paris, shows that this species has been misinterpreted by American authors — see Scribner & Merrill, U. S. Dept. Agr. Div. Agros. Bul. **24**: 36. 1901.

In the Herbarium of Columbia University is a specimen referable to this species labelled in Torrey's handwriting "*Panicum unciphyllum* Trin. in Lit." It is evident that this specimen was named by Trinius and while it is very possible that the plant in question may be different from the type of the species, we feel justified in taking up *Panicum unciphyllum*, rather than applying a new name to this very common grass. It is probable that an older tenable name will be found when the obscurity of many of the older species is cleared up, which can only be accomplished by examination of the types in the various European herbaria.

This species is exceedingly variable and many varieties or forms might be characterized on the basis of size and habit. The follow-

ing varieties and forms are recognized, a list which might be greatly extended, but in so doing it would only add more confusion to this difficult group, as we believe that no one would be able to recognize the forms described, no matter how minutely and carefully they might be characterized.

PANICUM UNCIPHYLLUM **implicatum** (Scribn.) (*Panicum implicatum* Scribn. U. S. Dept. Agr. Div. Agros, Bul. **11**: 43. *fig. 2.* 1898).

This form is characterized by its weak culms, small leaves, and small implicate panicles. Leaves 3 to 5 cm. long, 3 to 6 mm. wide, pilose on both surfaces with rather longer hairs than in the species. Spikelets as in the species. In the type collection this form was found to be growing in patches of considerable extent, which were conspicuous for their reddish or purplish color. On account of intermediate forms this variety can only be arbitrarily separated from the species.

General distribution: In marshes and wet soil, Maine to Illinois, south to North Carolina, June to August.

MAINE: Cape Elizabeth, salt marsh, *F. Lamson-Scribner*, July 26, 1895 (type); Orono, *M. L. Fernald*, Sept., 1890; East Auburn, moist pastures, *E. D. Merrill*, July 23, 1896, and in open woods, Aug. 1898; Manchester, *F. Lamson-Scribner*, July, 1896; Foxcroft, *M. L. Fernald*, July 25, 1894; Farmington, *M. L. Fernald*, July 8, 1896. VERMONT: Charlotte, low lands, *C. G. Pringle*, July 5, 1880. MASSACHUSETTS: South Framingham, *E. L. Sturtevant*, July 3, 1890, also *E. C. Smith*, Sept. 1899; Stoneham, meadow, border of Spot Pond, 335 *W. P. Rich*, July 4, 1894; gravelly path, border of Doleful Pond, 319 *W. P. Rich*, July 4, 1894; Winchester, *C. W. Jenks* and *C. W. Swan*, July 19, 1890; Milton, *J. R. Churchill*, June 27, 1891. Linden, *W. P. Rich*, Aug. 1, 1880; Sharon, *W. P. Rich*, July 5, 1895; Truro, *W. P. Rich*, July 4, 1895. CONNECTICUT: 78 *C. B. Graves*, June 16, 1899.

PANICUM UNCIPHYLLUM MERIDIONALE (Ashe) (*Panicum meridionale* Ashe, Journ. E. Mitch. Sci. Soc. **15**: 59. 1898; *Panicum filiculme* Ashe, l. c.)

This form is scarcely worthy of specific rank and can only be separated arbitrarily even as a variety, on account of intermediate forms. It is characterized by its small size, 10 to 30 cm. high, small leaves and panicles. Leaves 2 to 4 cm. long, about 4 mm. Panicle 2 to 5 cm. long. Spikelets as in the species.

General distribution: in dry soils, Massachusetts to North Carolina and Georgia, June to August.

MASSACHUSETTS: Hyannis, dry sandy soil, *J. R. Churchill*, July 4, 1896; *J. R. Churchill*, July 2, 1882; Nantucket, *L. L. Dame* (1887?); no locality, *C. W. Swan*.

Panicum filiculme Ashe cannot be distinguished from this form either by the original descriptions or by comparison of typical material.

Panicum unciphyllum forma **prostratum**. — A low, spreading, much branched form with lax, very few-flowered panicles, thin leaves, and spikelets nearly 2 mm. in length. Culms slender, some of them trailing. Panicle branches remote, spreading, few-flowered. — Dry woods, South Berwick, Maine, *M. L. Fernald*, September 26, 1897.

Panicum unciphyllum forma **pilosum**. — A slender, very pubescent, rather flaccid form, with small, ovate, exserted panicles, about 3 cm. long, erect leaves, which are pilose on both sides with scattered, long white hairs and spikelets nearly 2 mm. in length. — Dry woods, Orono, Maine, 501 *M. L. Fernald*, July 7, 8191.

The above two forms are readily distinguished from the species and are perhaps even more worthy of varietal rank than the forms treated above as varieties.

32. Panicum lanuginosum Ell. Sk. Bot. S. C. and Ga. **1** : 123. 1817. (*Panicum tennesseense* Ashe, Journ. E. Mitch. Sci. Soc. **15** : 52. 1898).—An erect or ascending finally much branched pubescent perennial 1.5–8 dm. high, with weak culms, very thin leaves and slightly exserted, usually many-flowered panicles. Culms geniculate below, papillate-pilose with few weak, spreading hairs; nodes yellow sparingly bearded with few, reflexed hairs, and generally with a smooth ring immediately below; sheaths shorter than the internodes, rather loose, striate, papillate-pilose with scattered spreading hairs; leaf-blades spreading or ascending, thin, soft, lanceolate, 3–8 cm. long 4–10 mm. wide, acute, slightly narrowed to the rounded base, scabrous on the margins, appressed-pubescent beneath with scattered, short, papillate hairs, and often also on the upper surface, giving the leaves a peculiar lustre or sheen. Panicles 4–8 cm. long, broadly ovate or sub-pyramidal, pale green; rachis pilose; branches capillary, spreading, the lower ones often densely flowered, and interlaced giving the panicle a characteristic matted appearance; secondary panicles included, few flowered. Spikelets ovate, obtuse; first glume hyaline, acute, one-fourth as long as the spikelet; second and third glumes, rather strongly striate, pilose with spreading hairs.

General distribution: in low thickets, woods and swamps, Maine to Illinois, south to Kansas and Mississippi, May to August.

Maine: Orono, low thicket, *M. L. Fernald*, July 7, 1892, and in sandy river thicket, July 12, 1897; Carrying Place Plantation, *M. L. Fernald*, July 29, 1892, an unusally smooth form. Vermont: Wallingford, *E. Brainerd*, Sept. 6, 1881; Middletown, *E. Brainerd*, June 13, 1880. Massachusetts: Framingham, *E. C. Smith*, July 24, 1899; Revere, Oak Island, *H. A. Young*, July 16, 1882; Revere, *W. P. Rich*, July 9, 1899; Melrose, Cascade Region, *W. P. Rich*, July 17, 1892; Malden, *H. A. Young*, June, 1879; East Gloucester, *C. W. Swan*, July 14, 1881; Beaver Brook Reservoir, *C. W. Swan*, July 6, 1894; Happy Valley, Stony Brook Reservoir, *W. H. Manning*, June 17, 1895. Rhode Island: Providence, *T. J. Battey*,

1886. CONNECTICUT: New London, *C. B. Graves*, 1898; Portland, *F. Wilson*, 1897.

This species is characterized by its lax habit of growth, thin leaves, which generally have a peculiar lustre or sheen, pale green, generally somewhat implicate panicles, at least in herbarium specimens, and long-pubescent spikelets. It is very closely related to *Panicum unciphyllum*, being distinguished by the characters noted above. *Panicum lanuginosum* is extremely variable and often can only be separated arbitrarily from the related species — it is possible that it should be considered only as a variety of the preceding species.

† † Plants pubescent with very short appressed hairs or only puberulent.

33. PANICUM COLUMBIANUM Scribn. U. S. Dept. Agr. Div. Agros. Bul. 7: 78. *fig. 60.* 1897. (*Panicum psammophilum* Nash, Bul. Torr. Bot. Club, **26**: 576. 1899.) — A slender, erect, tufted, finally much branched perennial, 2–4 dm. high, with firm, short, lanceolate leaves, and small flowered, oblong or subpyramidal usually purplish panicles, 2–3 cm. long. Culms usually purple, appressed-hirsute or puberulent below, puberulent above: nodes with few short hairs, similar to those of the culm; sheaths shorter than the internodes, appressed-pubescent, the basal ones with long hairs, the upper and those of the branches with very short hairs, rarely nearly smooth; ligule a dense ring of hairs about 1 mm. long; leaf blades erect or ascending, thick, rather rigid, serrulate on the cartilaginous margins, puberulent beneath, the ovate, lanceolate basal ones and occasionally also those on the culm with a few very long scattered erect hairs on the upper surface, the primary blades 2–5 cm. long, 2–5 mm. wide, those of the branches smaller. Axis and the usually ascending branches of the panicle puberulent. Spikelets broadly obovate, 1.3–1.5 mm. long, rarely slightly larger, obtuse, the first glume about one-third as long as the spikelet, 1-nerved, acute or obtuse; second and third glumes densely pubescent 7-nerved, the second usually a little shorter than the third.

General distribution: in dry sandy fields, sandy lake shores and especially near the coast from Maine to Virginia, May to August.

MAINE: St. Francis, gravelly shores, 166 *M. L. Fernald*, Aug. 5, 1893; Fort Fairfield, *M. L. Fernald*, July 14, 1893; South Berwick, *J. C. Parlin & M. L. Fernald*, July 14, 1896; Island Falls, *M. L. Fernald*, Aug. 26, 1897. NEW HAMPSHIRE: Manchester, *F. W. Batchelder*, 1895 (a large form). VERMONT: Burlington, sandy pine clearing, back of St. Marys Academy, "*J. E. H.*", June 25, 1898; "*C. E. S.*", 1893. Lake Champlain, sandy bank on lake shore between Rock Point and Appletree Point, *Ezra Brainerd*, June 16, 1898; South Burlington, *Mrs. Nellie Flynn*, July 5, 1896; Rutland, 1756, 1758 *W. W. Eggleston*, June 12, 1899. MASSACHUSETTS:

Truro, sandy roadside in Dyers Hollow, *W. P. Rich*, July 21, 1888, July 3, 1895, and in sandy fields, Aug. 5, 1896; Nantucket, sandy shore, Gibbs Pond, *W. Deane*, Sept. 11, 1885; Stoneham, wet soil near South Reservoir (843 in part) *W. P. Rich*; Framingham, *E. C. Smith*, June 8, 1899 and 738 *E. C. Smith*, July 21, 1899; South Dennis, 11 *E. Brainerd*, Aug. 22, 1877; Nantasket Beach, *E. Brainerd*, June 11, 1896. CONNECTICUT: Waterford, dry sandy woods, Fog Plain, *C. B. Graves*, July 5, 1898 and in hemlock grove at "Precipice" June 20, 1898.

§ III. ECHINOCHLOA.

Spikelets densely imbricate, in thick, three- to four-ranked racemes, which are alternate on the common rachis, sessile or short pedicellate; second and third glumes very acute, muricate-hispid generally bearing a long scabrous awn.

* Sheaths smooth.

34. PANICUM CRUS-GALLI Linn. Sp. Pl. 56, 1753. (*Echinochloa crus-galli* Beauv. Agrost. 53. 1812.)—A coarse, erect or ascending leafy annual, 3–12 dm. high, with densely flowered panicles. Culms smooth, often branching near the base; sheaths loose, very smooth, ligule none; leaves rather broad, flat, 0.5 to 6 dm. long, smooth or scabrous on the surfaces, margins serrulate. Spikelets densely and irregularly crowded in 3 or 4 rows along one side of the short spike-like branches of the panicle, these branches 5 to 15 or 20, usually simple, the lower ones 2–8 cm. long, becoming shorter and more crowded above, usually erect or ascending. Spikelets about 3 mm. long; first glume one-fourth to one-half the length of the spikelet, acute or mucronate-pointed, 3-nerved; second and third glumes smooth, pubescent or muricate-hispid along the nerves; the second 5-nerved, awnless or short-awned; the third 7-nerved, at least near the tip awnless or sometimes long-awned, and with a palea in its axil; fourth or fruiting glume smooth, awnless, or short awn-pointed.

General distribution: a well known annual of rank growth common throughout the United States in cultivated and waste places. Introduced from Europe. Some apparently native forms, usually with long-awned spikelets are found along water courses in the south. July to October.

The awnless form has been called variety *muticum* by various authors.

MAINE: North Berwick, *J. C. Parlin*, Aug. 1898; Rumford, *J. C. Parlin*, 1890; Orono, *F. L. Harvey*, Aug. 1895, *F. P. Briggs*, Aug. 1890; East Auburn, *E. D. Merrill*, July, 1897; North Berwick, wet clay soil, *J. C. Parlin*, Aug. 26, 1894 (awnless form). NEW

Hampshire; Gilmanton, *J. Blake*, Aug. 21, 1876; Jaffrey, near dwellings, 566 *B. L. Robinson*, Aug. 7, 1898. Vermont; Burlington, *L. R. Jones*, Oct. 12, 1889; Alburgh Springs, *W. W. Eggleston* & *L. R. Jones*, Aug. 30, 1893 (awnless form); Hartland, *B. P. Ruggles*, no date; Manchester, 272 *M. A. Day*, July 30, 1898. (awnless or nearly so). Massachusetts: Melrose, ditches near Long Pond, *W. P. Rich*, Aug. 29, 1891, a depauperate form; Revere, Oak Island, *H. A. Young*, Aug. 13, 1882 (awnless form) and Sept. 20, 1879; Blue Hills, *W. H. Manning*, Sept. 1, 1879; Charleston, *C. E. Perkins*, Aug. 16, 1880, South Framingham, *E. L. Sturtevant*, Aug. 10, 1890; Nonquit, *E. L. Sturtevant*, July 20, 1889; South Boston, *W. P. Rich*, Aug. 16, 1888 (awnless or nearly so); Lynnfield, borders of a bog, *W. P. Rich*, Aug. 21, 1892; Dedham, low ground near Wigwam Pond, *W. P. Rich*, Aug. 22, 1897, also *E. F. Williams*, Aug. 22, 1897; West Cambridge, *E. F. Williams*, Aug. 28, 1897 (awnless or nearly so). Cambridge, *W. Deane*, Aug. 24, 1883; Dorchester, *J. R. Churchill*, 1883, Deerfield, *J. R. Churchill*, Aug. 10, 1887. Connecticut: Southington, *L. Andrews*, Aug. 2, 1898 (awnless form).

* * Sheaths hispid.

35. Panicum walteri Pursh. Fl. Am. Sept. 1: 66. 1814. (*Panicum hirtellum* Walter, Fl. Car. 72, 1788, not All. 1785; *Panicum hispidum* Muhl. Descr. 107. 1817; *Panicum crus-galli* var. *hispidum* Torr. Fl. N. Y. **2**: 424. 1843.

A robust, erect or ascending annual 9 to 18 dm. high, with the lower sheaths strongly papillose-hispid, and large long-bearded purplish panicles. Culms glabrous; sheaths loose; ligule obsolete or consisting only of a few hairs; leaf-blades 3 dm. long or more, 1 to 2 cm. wide, generally smooth beneath, strongly scabrous above. Panicle 15 to 45 cm. long, with 10 to 40 ascending or spreading branches. Spikelets densely crowded in 2 to 4 rows on one side of the scabrous hispid rachis, brownish-purple; second and third glumes about 3 mm. long, scabrous and strongly hispid, tipped with introrsely barbed awns, sometimes 3 to 6 cm. long; flowering glume ovate-lanceolate, acuminate.

General distribution: in marshes and ditches, generally near salt or brackish water, Massachusetts to Florida and Louisiana, August to October.

Massachusetts: South Boston, waste ground, *H. A. Young*, Sept. 20, 1878; Dorchester, marsh, *J. R. Churchill*, Aug. 30, 1884; Hyannisport, *J. M. Greenman*, Sept. 5, 1898, *J. R. Churchill*, Aug. 29, 1888, also *W. Deane*, same date and locality; Revere, *J. Blake*, Aug. 26, 1885; Medford, in brackish ditch, F. *S. Collins*, Sept. 15, 1887; Marthas Vineyard, *Sydney Harris*, Aug. 26, 1894; Swampscott, *C. W. Swan*, Sept. 16, 1888, a depauperate form. Connecti-

cut: Madison, "*T. E. H.*" Sept. 10, 1898, in Herb. Univ. Vt.; New Haven, Gray Herbarium, no collector or date; Southington; *L. Andrews*, Aug. 14, 1898.

Doubtful or excluded species and those which may be expected in southern New England.

Panicum texanum Buckley. This species has been collected in waste about cotton mills, at Malden, Massachusetts, *F. S. Collins*, September 15, 1888. Introduced from Texas and in all probability will not persist.

Panicum addisoni Nash. There is a specimen of this grass in the Blake Herbarium, University of Maine, labelled as collected at Andover, Massachusetts, by J. Blake, July 29, 1882. It is evident there was a mistake in copying the label, and therefore this species is excluded, although it may occur in New England. The specimen so reported from Connecticut by C. B. Graves, Rhodora, **3**: 63. is a robust form of *Panicum columbianum.*

Panicum tsugetorum Nash, has been reported from various places in New England, but there are no specimens in any of the collections examined. It probably occurs in southern New England.[1]

Panicum stipitatum Nash. (*Panicum elongatum* Pursh, not Salisb.) A species very closely related to *Panicum agrostoides* is to be expected from southern New England, as it occurs about New York City.

Panicum scoparium Lam. The New England form which has been referred to this species is *Panicum scribnerianum* Nash. True *Panicum scoparium* Lam. is the form described by Elliott as *Panicum viscidum*, a southern species, while *Panicum scoparium* of Elliott, a very distinct form, is now known as *Panicum ravenelii* Scribn. & Merrill. For discussion of this species see Scribn. & Merrill, U. S. Dept. Agr., Div. Agros. Bul. **24**: 34. 1901.

Panicum pubescens Lam. From examination of typical material in the Herb. Mus. Paris, was found to be the late branched

[1] Since the above article has been in press we have received specimens of *Panicum tsugetorum* Nash, from Dr. C. B. Graves, No. 170. collected on Mason's Island, near Mystic, Connecticut, July 15, 1897. It is a tufted somewhat pubescent perennial 2 to 4.5 dm. high with slender at length much branched culms, thin leaves and small pubescent spikelets. Culms and sheaths pubescent with short appressed hairs, intermixed toward the base with longer ones. Leaf blades erect or ascending, lanceolate, minutely appressed-pubescent beneath, glabrous above, 4 to 8 cm. long, 5 to 8 mm. wide, those of the branches smaller. Primary panicle ovate, 4 to 6.5 cm. long, its branches few-flowered, spreading, ascending, spikelets ovate, 18 mm. long, the three empty glumes pubescent.

This species is very closely related to certain forms of *Panicum lanuginosum* and in many cases can only be distinguished by the appressed-pubescent lower surface of the leaves.

stage of *Pani um scoparium* Lam. (*Panicum viscidum* Ell.) See Scribner & Merrill l. c. 36.

PANICUM LAXIFLORUM Lam. of Gray's Manual, ed. 6, 633 and (?) Trin. is *Panicum boreale* Nash. *Panicum laxiflorum* Lam. is a southern species.

DIVISION OF AGROSTOLOGY, U. S. Dept. Agric., Washington, D. C.

SOME MAINE PLANTS AND THEIR USES, "WISE AND OTHERWISE."

JENNIE M. H. MORRELL.

THE following partial list of Maine plants and their uses is based upon my own observations and recollections as well as upon notes furnished me by others who have known the plants to be used.

Pteris aquilina. When this first starts growth in the spring it is cooked and eaten in place of asparagus, and I am told that one cannot tell the difference by tasting.

Osmunda cinnamomea. The heart of the root is eaten by children for its nutty taste. It is said to have some medicinal value, and is known sometimes as "bog onion."

Taxus Canadensis. The red berries of this, the ground hemlock, were one of the favorite fruits of my school days.

Typha latifolia. The leaves are gathered, dried and marketed: they are used by coopers in making molasses hogshead, the leaves being placed between the staves to make them tight. In early times the heads or cat-tails were used in place of feathers for making beds.

Arisaema triphyllum. The corms, dried and boiled, are said to have been extensively used as food by the Indians.

Acorus Calamus. Many people enjoy eating or nibbling the root of the sweet flag; and I remember seeing cough syrups made by boiling molasses and sweet flag. The root is candied by the Shakers and sold at Poland Springs.

Lilium Canadense. The Indians used the bulbs in making soups and in thickening their broths which were thus made more palatable.

Medeola Virginiana. The roots when used like cucumbers taste very like them and are certainly clean enough for food.

Cypripedium acaule. A decoction of the root of this or any of the other Cypripediums, known as "nerve-root" or "squaw-root," is taken internally to cure neuralgia and nervous diseases.

Myrica cerifera. The leaves, under the name of bayberry, are used to stuff pillows. In early times candles were made from the wax contained in the leaves, fruit, and twigs; and in burning they gave off a pleasant fragrance. The wax is now used by the Shakers in the preparation of a fine salve.

Myrica asplenifolia. The branches and leaves are steeped and the decoction is used to kill the poison of *Rhus Toxicodendron.*

Betula populifolia. Some people made their vinegar from the sap of the white or gray birch.

Rumex Acetosella. Red sorrel has been used in Aroostook County to make pies.

Chenopodium album. The pigweed, used to color the curd in making sage cheese, has been thought also to make the cheese rich. Under the name of lamb's quarters it is commonly used for greens.

Caltha palustris. Under the name, cowsiip, the plant is much sought for greens, and it is sometimes cultivated.

Coptis trifolia. The roots of gold-thread are used for canker in the mouth.

Actaea spicata, var. *rubra.* Under the name of "cohosh" this is used as a remedy for heart troubles.

Hepatica triloba. Used for consumption, and under the name of liverwort for liver troubles.

Geum rivale. The plant is called chocolate-root, and the root when boiled makes a drink like chocolate.

Prunus Pennsylvanica. Fire cherries in combination with currants make a fine jelly. Used alone they make a jelly which is considered very healthful and healing if one has throat or lung troubles.

Prunus Virginiana. Choke cherries are sought to be eaten fresh. Cooked they make nice pies and sauce.

Prunus serotina. Black cherries are better eaten fresh than either of the previous. They are used in making cherry wine and also for a jelly which is considered to have considerable medicinal value.

Impatiens fulva. The juice of bruised leaves of this, "Celandine," is said to be a sure cure for the poison of *Rhus Toxicodendron.*

Daucus Carota. Carrots raised from seeds of the wild plant are said to be sweeter than the common garden varieties, but I think most people look upon them as poisonous.

Carum Carui. Caraway seed is used in cakes and in candy.

Ledum Groenlandicum (*L. latifolium*). The Labrador tea is used for canker in the stomach, and sometimes for dysentery.

Asclepias Cornuti. The young shoots are sometimes used for greens. The ripened pods are opened and used for decorative purposes. The silky down of the seeds is used for fancy bags and pillows, and it is said to have been spun for candle-wick by early settlers

Scutellaria lateriflora. Skullcap steeped and drank induces sleep.

Nepeta Cataria. One of my neighbors came in a hurry one day to get some of my dried catnip. She said her husband was threatened with pneumonia, and that catnip used in poultices and taken internally as a tea was a sure cure. I had long known of people using catnip tea for headaches and stomach troubles.

Physalis heterophylla. The fruits make nice preserves. In an old cook-book they are called husk-tomatoes.

Datura Stramonium. The capsules are smoked for asthma, and the root is sometimes used medicinally by country people.

Sambucus Canadensis. The flowers are used by my neighbors for elderberry wine, as are the berries also when they come later. Some people make a delicious jelly from the berries.

Viburnum Opulus. The fruit, known as "highbush cranberry" is used for sauce and jellies.

Cucurbita Pepo. Pumpkin seeds have been used to make custard pies, eight seeds shelled and pounded being used in place of one egg. Apple seeds are sometimes used in the same way, many more seeds, of course, being needed.

Eupatorium perfoliatum. Under the name, thoroughwort, this is used as a tea for colds, in syrups with molasses for coughs, and is supposed to be a good blood medicine. It is also much used in diseases of cattle.

Eupatorium purpureum. Joe-Pye-weed is used in Bright's disease.

Solidago. The blooms of various kinds are used to dye yellow.

Aster macrophyllus. The leaves were used in Gardiner fifty years ago as greens. They were called "tongue."

Tanacetum vulgare. Tansy cheese used to be made by steeping the tansy and pouring the tea into the milk before the curds were made.

Arctium Lappa. Burdock leaves are much used in the country as draughts to relieve fevers and headaches. The root is used in medicine.

Leontodon autumnale. Under the name of Arnica this is used in alcohol to relieve bruises, lameness, and rheumatism. A Farmingdale man declares it the best remedy known. The buds of Balm of Gilead, *Populus balsamifera*, are used in a similar way.

Taraxacum officinale. The dandelion is much used for greens. The root is said to give a very nice rich flavor to coffee, and it is sometimes used as a medicine. The roots of dandelion and of *Aralia nudicaulis*, the leaves of *Chimaphila umbellata* and *Gaultheria procumbens*, and the young shoots of hemlock and spruce are used in making root beer.

A strange dish of greens was once prepared, under the direction of an old woman of Irish descent, in my father's house. These were dandelions; two or more species of *Rumex*, one of which was *R. Acetosella*; the young shoots and leaves of the red raspberry; the young fronds of *Pteris aquilina*, under the name of hog-brake; and a generous portion of Canada thistle, *Cnicus arvensis*.

Gardiner, Maine.

NOTES ON ALGAE, — III.

F. S. Collins.

The species here mentioned either are new to the American Flora, or their range is extended by the localities given. Unless otherwise indicated, they were collected by the writer.

Protoderma marinum Reinke, Algenflora der westliche Ostsee, p. 81, was found by the writer at Bridgeport, Connecticut, on New Year's day, 1900, on the shore by Seaside Park, where it formed a very thin, transparent, pale green coating on small pebbles in pools. The coating consists of a single layer of small polygonal cells, with rather thick walls; when examined with the microscope, many of the cells were found to be producing zoospores. In May a little of the same species was found at Newcastle, N. H., but not fruiting. In November it was quite abundant at Revere Beach, Mass., and

produced zoospores plentifully. Probably it occurs all along the coast, but it is so inconspicuous that unless one is looking for it, it will hardly be found.

Plectonema Nostocorum Bornet was found in the gelatine of a small Nostoc, growing in a watering trough by the side of the road from Seal Harbor to Jordan Pond, Mount Desert, Maine, July 16, 1900. It is a very minute plant, the filaments being only 1 to 1.5 μ diameter, is common in Europe in connection with various gelatinous algae, and will probably be found equally abundant in this country. It is described and figured in Gomont, Monographie des Oscillariées, p. 122, pl. I, fig. 11.

Ectocarpus fasciculatus var. *abbreviatus* (Kuetz.) Sauv. seems to be common on Laminariaceae from Boston north. It usually covers the older part of the lamina of the host with a dense coating, the fronds seldom over a centimeter high. The fructification is like the type, except that the sporangia are often clustered, and are often found, apparently proliferous, on the main stem, sometimes at the very base; the branching is quite irregular.

Elachista Chondri Aresch., Obs. Phyc., part 3, p. 17, pl. II, fig. 2, occurred at Ochre Point, Newport, R. I., May 26, 1900, growing on *Chondrus crispus* (L.) Stack. near low water mark, at a point exposed to the surf. In general appearance it is not unlike *E. fucicola* (Velley) Fries, common everywhere on *Ascophyllum nodosum*, and occasionally on other plants. Most of the species of Elachista seem to be limited to one or a few host plants each, and this species was found by its author growing on *Chondrus crispus* and *Furcellaria fastigiata* (Huds.) Lamour., on the coast of Sweden. The latter host has not been found in America, but the Chondrus is very common along the whole New England coast. Possibly it may be found that *E. Chondri* is not rare, but certainly it is not common; the writer has for two or three years given some attention to Chondrus, in regard to the different organs of fructification, and would hardly have overlooked a plant like *E. Chondri.*

Actinococcus aggregatus Schmitz, Flora, p. 385, 1893, occurs on *Gymnogongrus Griffithsiae* (Turn.) Mart., growing at low water mark on the beach at Portsmouth, Rhode Island, near Wood Island Park; it was fairly abundant in June, 1900. The genus Actinococcus is made up of several species, each formerly supposed to be the tetrasporic fruit of some alga, which is now considered merely the host

plant. The vegetative portion of the parasite is much reduced, consisting merely of filaments penetrating the host, and winding about among the cells of the frond. The fructification is external, and consists of a cushion of densely packed, radiating filaments, the cells of which at maturity are changed into tetraspores. Several genera of this character have been described by Schmitz; we have three species in New England, *Sterrocolax decipiens* Schmitz on *Ahnfeltia plicata* (Turn.) Fries; *Actinococcus subcutaneus* (Lyng.) Schmitz on *Phyllophora Brodiaei* (Turn.) J. Ag., and *A. aggregatus* on *Gymnogongrus Griffithsiae*. It is a curious fact that in each case the parasite has tetrasporic fruit of the character appropriate to the host, while the host appears to have lost the capacity for producing tetraspores, and is propagated either by cystocarps, or only vegetatively.

Melobesia Corallinae Crouan was found on a frond of *Corallina officinalis* L., by Mr. L. L. Dame at Siasconset, Nantucket, and reported in Mrs. Owen's Plants of Nantucket, in 1888. There is no other report of its occurrence, but this year it was found in considerable quantity at Newport, Rhode Island, and at Nahant, Massachusetts, and more sparingly at Seal Harbor, Mount Desert, Maine. Probably it may be found wherever *Corallina officinalis* is common.

In Rhodora, Vol. II, p. 11, the writer noted the occurrence of a single specimen of *Ralfsia Borneti* Kuckuck at Seal Harbor, Maine. Since then this species has proved to be common on rocky shores along the whole New England coast, growing on pebbles, Lithothamnion, and especially on the shells of live mussels.

Miss E. M. Cherrington of Hyde Park, Mass., has been so kind as to allow the writer to examine a collection of algae made by her on the Maine coast last summer, and among them are three species not hitherto reported from that region. One of them, *Monostroma latissimum* (Kuetz.) Wittr., was to be expected, though it is certainly not very common, as the writer has looked for it every summer for the past twelve years unsuccessfully. Miss Cherrington's specimens were collected at Bayville, in July. The other two are of considerable interest, being species hardly to be expected there. At Port Popham, at the mouth of the Kennebec, Miss Cherrington found several specimens of *Callithamnion tetragonum* (With.) Ag., not depauperate specimens, but well developed individuals, over 12 cm. high. This species has never before been reported north of

Cape Cod, though the nearly allied *C. Baileyi* Harv. occurs, in the slender, delicate var. *boreale*, in Massachusetts Bay, and is reported by Farlow, N. E. Marine Algae, p. 127, as found by C. B. Fuller at Portland. But the plants now in question do not approach ordinary *C. Baileyi*, much less the var. *boreale*; they are quite like typical *C. tetragonum*, as found at Newport, Rhode Island.

The third species, *Lomentaria rosea* (Harv.) Thuret has hitherto been found only from Vineyard Sound to Newport, growing in deep water in company with *Scinaia furcellata* (Turn.) Bivona, which has practically the same range. The only exception to this is in Harvey, Nereis Bor. Am., part 2, p. 186. In the list of habitats, is given *β*, Portsmouth, N. H., Dr. Durkee. There is no description of var. *β*, but this note: "Dr. Durkee's specimen, noticed above, is irregularly branched, the primary stems filiform and straggling, the secondary either pinnated or furnished at one side only with pinnules. I have seen British specimens similar to this in ramification." This reference has been generally regarded somewhat as Pike's report of *Bostrychia rivularis* Harv. at the Isles of Shoals, but Miss Cherrington's finding the plant at East Boothbay, July 22, makes it quite credible. The specimens are small, hardly 2 cm. high, but agree better with the plates in the Phycologia Britannica than with the description of the Portsmouth plant.

This species was described and figured by Harvey in the Phycologia Britannica, Pl. CCCI, as *Chrysymenia rosea* var. *Orcadensis*, with a reference to *C. Orcadensis* of Harvey's Manual, ed. 2, p. 100. In Pl. CCCLVIII A, of the Phycologia, a figure is given of *Chrysymenia rosea* from the Yorkshire coast, but the distinction of type and variety seems not to have been followed by subsequent authors. There appears to be no record of it in Europe except on the coasts of England and Scotland; its presence among the warm water algae of the English Channel, and also at the Orkneys and on the East Coast of Scotland, where *Euthora cristata* (L.) J. Ag. occurs, is paralleled by its occurrence in the warm waters of southern New England, and on the Maine Coast.

It is of interest to note that though Harvey figures British specimens, he speaks of the name of *Chrysymenia rosea* having been first given, in his herbarium, to specimens received from Newport, Rhode Island.

The occurrence in a comparatively small collection of these three species new to Maine, and two of them extending the known

range of the species in an interesting way, shows what possibilities still remain for any intelligent botanist, even with little previous knowledge of algae. Very likely there are many collections similar to Miss Cherrington's which when examined might yield results of equal interest.

During the past summer two species have been found on our coast, which appear to be new, and which are characterized as follows.

Isactis **centrifuga** Bornet ms. Frond dark green or nearly black, up to 4 cm. diameter, growth marginal, the central portion of the frond becoming detached from the substratum and rounding upwards, while the margin remains closely attached. Filaments 8–12 μ diam., slightly swollen at base, reaching a length of a millimeter; sheath firm, usually translucent, sometimes brownish and opaque; trichomes 8–10 μ diam., cells one third to one half as long as wide; heterocysts basal, spherical or depressed; rarely intercalary, spherical or elongate. On rocks near low water mark, Ochre Point, Newport, R. I., May 26, 1900. — Dr. E. Bornet in litt.

This plant was at first supposed by the writer to be *Rivularia Polyotis* (J. Ag.) Born. & Flah., which might be expected on our coast; but on submission of specimens to Dr. Bornet, the latter pointed out the distinctly marginal growth of the frond, which would refer it to the genus Isactis. This genus has hitherto been monotypic, *I. plana* (Harv.) Thuret, growing on algae, shells and stones, being found in the Mediterranean and in the warmer waters of both sides of the North Atlantic. From this well known plant *I. centrifuga* differs by the thicker frond, larger filaments and trichomes, and especially by its character of loosening itself from the substratum at the centre, while the margin continues firmly attached and growing; sometimes the older parts are broken away leaving only a ring.

Pleurocapsa **crepidinum**, n. sp. Cells spherical or by mutual pressure polygonal, up to 15 μ diameter; cell wall rather thin, translucent, contents dull blue or slate color. Cells dividing vegetatively, often remaining attached in dense masses; sporangia spherical, filled with small spores.

This considerably resembles *P. amethystea* Rosenvinge, Grønlands Havalger, p. 968, fig. 57, and it was at first supposed to be that species; but Dr. Rosenvinge, to whom a specimen was sent, pronounces it distinct. *P. amethystea* has a lilac or violet color, and less regular sporangia, the formation of the spores seeming to be rather the

result of a coccoid stage than produced by true sporangia. The appearance of *P. crepidinum* is much that of a Dermocarpa, but the true vegetative cell divisions place it in Pleurocapsa.

It occurred sparingly in a coating composed of several minute algae, on the woodwork of an old wharf, at Otter Creek, Mount Desert, Maine, July 17, 1900.

Protoderma marinum was included in the Preliminary List published in RHODORA, Vol. II, p.45; *Ectocarpus fasciculatus* var. *abbreviatus*, *Isactis centrifuga*, *Elachista Chondri*, and *Actinococcus aggregatus* were issued in the Phycotheca Boreali-Americana, Nos. 731, 757, 773 and 786, respectively; *Melobesia Corallinae* will appear in a later fascicle.

NOTES ON HYBRIDS OF QUERCUS ILICIFOLIA.

ALFRED REHDER.

WHILE botanizing last year about the middle of September in the Blue Hill Reservation and following the path which leads from Blue Hill Avenue to the top of the hill, I directed my attention to the varying shapes of the foliage of the Oaks. *Quercus rubra*, *coccinea*, *velutina*, *alba*, *ilicifolia* and *prinoides* are common there, with the exception of the last named species, and form, in fact, the chief components of the second growth which clothes the hill. The top is almost exclusively covered by the low growth of *Quercus ilicifolia*, hardly exceeding 5 ft. in height. As I reached this region and was passing the last higher bushes of *Quercus coccinea* and some other trees, my attention was attracted by a small tree bearing foliage similar in shape to that of *Quercus ilicifolia* but differing in habit and greater height from this species. The leaves, too, although they had almost the outline of those of *Quercus ilicifolia* showed a marked difference in the tomentum of the lower surface, which was only slightly tomentose or almost glabrous in most of the leaves. These characters led me at once to the conclusion that I had stumbled on a hybrid of *Quercus ilicifolia* with a species of the *Q. rubra* group and I naturally suspected first *Q. coccinea*, which grew plentifully around it, to be the other parent. A closer examination,

however, did not verify this opinion since the cup scales and the winter buds were more tomentose than in either of the suspected parents and make more probable the parentage of *Q. velutina*, though the smallness of the foliage and winter buds points more toward *Q. coccinea.* The shape of the few-lobed leaves seems to exclude *Quercus rubra*, as also the smallness of the acorns which are almost indistinguishable from those of *Q. ilicifolia* save for the somewhat deeper cups and the more tomentose scales. It is therefore not without hesitation that I pronounce the Oak in question a hybrid of *Q. ilicifolia* and *velutina* but it seems to me the most probable explanation of this peculiar form.

I noticed only two small trees of this hybrid standing close together on the left side of the path not far from the top and a little below the last larger *Pinus rigida.* The trees, of which the larger is about 15 ft. high with a girth of 7 inches at the height of 5 ft. where the first branches appear and the smaller about 12 ft. high, seem to spring from a common root and are probably second growth from a decayed stump. The main branches diverge at a more acute angle and are less crooked than in *Q. ilicifolia.*

Quercus ilicifolia Wangenh. (*Q. nana* Sarg.) × velutina Lam. Small tree with spreading branches; branchlets dull yellowish or reddish brown, tomentulose when young: winter buds globose-ovate, obtuse, 1–1½ lines long, covered with dense yellowish gray tomentum: leaves 1½–4 inches long, rounded or cuneate at the base, pinnately lobed with 2–3 pairs of spreading lobes and with the sinuses reaching almost half way to the middle, lower lobes broadly triangular-ovate, entire, middle lobes triangular ovate or sometimes oblong-ovate with 1–3 small bristle-like teeth, upper lobes short and entire, small close to the apex and separated from the middle lobes by wide and very shallow sinuses, upper surface dull dark green, lower one paler and covered at maturity with a thin floccose grayish tomentum which often almost disappears at length except in the axils of the veins and along the midrib: acorns short-stalked; cup top-shaped contracted at the base into a short thick scaly stalk; the scales densely covered with a fine yellowish gray tomentum; nut globose-ovoid, about 6 lines long, slightly striate, tomentulose.

Specimens are preserved in the herbarium of the Arnold Arboretum, in the Gray Herbarium and in my own private herbarium.

The accompanying plate kindly prepared by Mr. C. E. Faxon will serve to give a clearer idea of the exact shape of the foliage than a description possibly can. Leaves of the two other hybrid forms of *Q. ilicifolia* mentioned below are shown on the same plate for comparison.

An Oak supposed to be of the same parentage as the above described hybrid has been reported from Ocean Grove, N. J., by J. K. Haywood (see Sargent, Silva N. Am. 8, p. 156).

Specimens of this form are preserved in the herbarium of the Arnold Arboretum, but as no fruits have been collected, it seems inadvisable to venture any definite opinion about it. The leaves differ from the hybrid described above chiefly by their larger size; they are 4–7 in. long, besides they are less deeply lobed with broader and shorter entire lobes, the winter buds are larger and more pointed and the young branches more glabrous.

Another interesting hybrid of *Quercus ilicifolia* was found about 45 years ago in Northbridge, Mass., by Dr. J. W. Robbins of Uxbridge, Mass. It is mentioned by A. Gray in Man. Bot. Ed. 5, p. 454 (1867) as a hybrid of *Q. ilicifolia* and *coccinea*. By Dr. Robbins it was designated as *Q. palustris* × *ilicifolia*, but this is not probable since *Q. palustris* does not grow in this region. He gives in a note accompanying his specimens, which are preserved in the Gray Herbarium, the following account of the tree itself and the locality where he found it. Perhaps it may help to ascertain whether the tree is still existing.

" *Q. palustris* × *ilicifolia* Robbins. Flowers gathered on the 20th of May, 1866, from a tree 40° high and 19′ in circ. 7° from the base; hybrid in all probability from the species indicated; the former of which a tree 2° in diam. stands at a distance of but 4 rods and the other a shrub beneath it and elsewhere in the vicinity. The tree overhangs the old road to Uxbridge about the middle of a small wood, half a mile southwest of Whitinsville in Northbridge, Mass. The frost color of the leaves is intermediate between the red of one and the dull brown of the other. The ripe acorns are mostly striate. I first noticed the tree as peculiar about 1855."

Quercus coccinea × ilicifolia (A Gray Man. Bot. ed. 5, p. 454 (1867). — Engelmann, Trans. St. Louis Acad. 3: 542 (1876). — Sargent, Silva N. Am. 8: 156 (1895) is very similar to the hybrid from Blue Hill. The young branches remain tomentulose until autumn: winter buds ovate, about 2 lines long; scales ciliate and yellowish appressed-pubescent chiefly in the middle: leaves 3½–5½ in. long, in shape almost like those of the hybrid from Blue Hill, but the middle lobes narrower and longer, the sinuses deeper and the texture somewhat thinner, usually rounded at the base; petioles about 1 in. long: acorns very short-stalked; cup almost hemis-

pherical contrasted at the base into a short scaly stalk; scales appressed-pubescent, but glabrous at the margin and apex; nut oval, 6–7 lines long, striate, glabrous.

Arnold Arboretum.

Explanation of Plate 24. — *Quercus ilicifolia* × *velutina* from Blue Hill: fig. 1, fruiting branch; *Q. ilicifolia* × *velutina* from Ocean Grove: fig. 2, leaf; *Q. coccinea* × *ilicifolia*: fig. 3, acorn; fig. 4, leaf. All figs. one half natural size.

TWO MUSHROOM BOOKS.

To amateurs of mushrooms, who have found the literature of the subject at times hopeless and dreary, a little volume[1] recently published in Philadelphia should bring recreation and entertainment. Inspired to see, with Emerson, that "a poor fungus or mushroom .... is the symbol of the power of kindness," the authors of the modest volume were led by the difficulties that beset the path to knowledge to think of the trials and distress of others that might follow in their footsteps. How could they help them? "This little book is the answer." "Let us give our own experience," they said, and they have told it in language as simple as it is diverting.

To review the book seriously would be cruel. It is not meant to be reviewed, but to be read and enjoyed, in the spirit in which the authors carried on their studies. By quotation, however, the true value of the book to the weary student can, perhaps, be indicated. "We began for pleasure and recreation, but it became irksome and fatiguing, and the subject which might have amused us .... is put aside and abandoned."

The introduction transports us from "the bustling, noisy streets of a city into the quiet fields and woods, where the bright-hued mushrooms" invite us to "the discovery of new specimens, the learning of their names, the knowledge of their curious organizations" which "will all add an interest to our lives." "Among the fallen leaves — peers out a bright yellow mushroom." We dig it up. "We have brought a basket and trowel and can examine them thoroughly."

[1] Among the Mushrooms. A Guide for Beginners. Emma L. Dallas and Caroline A. Burgin, Philadelphia, 1900; Drexel Biddle, Publisher. pp. 175, $2.00.

From the woods we pass presently to the study, to learn that "Fungi have existed from early geological ages," the oldest known Hymenomycete, being the one that "was called Polyporites Bowmanii." "It is interesting to know that even before the Tertiary period the undergrowth consisted of ferns and fleshy fungi. What a time of delight for the botanist! But there were no human beings in those days to roam amongst that luxuriant undergrowth, and only the fossil remains in the deposits of coal and peat are left to tell of their former existence." Alas! Untimely fate of early man!

Under various heads follows much information as to structure, habit, etc., that can be gathered rather better from other books. No where else, however, can we learn that the "group of Basidiomycetes is divided into (1) Stomach fungi, (2) Spore sac fungi, and (3) Membrane fungi"; or that in Agarics the gills "contain the spores"; or that the trama "lies between the two layers of gills in Agarics."

In an outline of the system of classification, the principal genera are briefly characterized, and the meanings of their names are elucidated. The student may here learn much that no lexicon will ever reveal to him: that Lactarius = milk; Marasmius = to wither; Cortinarius = a veil; and Telamonia = lint. Having worked through the genera in this way, the authors proceed to give descriptions "of fungi familiar to most persons, classified according to the colors of the cap." The list begins with *Russula emetica*,[1] described, as is not unusual, in such a way as to make it very doubtful whether the writers know the species. Thus, no mention is made of its viscidity, and it is said to grow "among dead leaves, in the woods and open places from July to December." *Cortinarius alboviolaceous*, the last species in the list, exemplifies a prevalent uncertainty in the handling of the Latin names. Then follows "a list of fungi that we constantly see, but which cannot be classified by the color of the cap." Here we find much curious information, as in regard to *Clavaria flava*: "Stevenson does not mention this species, so it may be peculiar to this country." Of the Jew's Ear we learn a new habitat: "It is a very peculiar-looking fungus, shaped somewhat like the human ear, of all sizes, and grows in great quantities in the same place."

But it is impossible, even by continuing to quote, to give the charm

[1] See note by Dr. Burt in RHODORA **2**: 71; March, 1900.

of this modest and kindly attempt to smooth the way to knowledge. Only the possession and leisurely perusal of the little volume will reveal its unique character.

Quite different must be the attitude of a reviewer to the latest book placed before the public.[1] Written by a person with botanical training, "The Mushroom Book," lays claim, or should, to scientific accuracy and method. It is, to be sure, avowedly a popular book. The publishers would have wished to undertake no other kind. But even popular books can and should be scientific, in the true meaning of the word, that is to say, they should present facts accurately and systematically.

The book makes an admirable first impression, due to the amplitude of the pages and spacing, the broad margins, clear printing sharply outlined cuts, and excellent plates. The publishers indeed, have done their work well. Examination of the book unfortunately, effaces this good impression. The introductory matter, it is true, is on the whole well arranged and expressed, especially the chapter headed "From Spore to Mushroom." The Key which follows, too, is made intelligible to the novice by abundant diagrams illustrating the terms employed. It is with the bulk of the book, the hundred pages descriptive of genera and species, that fault must be found. Here there is absolute confusion. Groups, and genera under groups, are taken up, as it seems, haphazard. In the white-spored series of Agarics, for instance, the first five genera in order are Amanita, Cantharellus, Amanitopsis, Mycena and Lentinus, and the last five are Schizophyllum, Omphalia, Russula, Clitocybe and Tricholoma. Whatever may have determined this succession, it was not the probable convenience of the student, for no knowledge of any principle of classification will guide him when he wishes to refer to the description of a species and, if he has no such knowledge, he is not likely to be assisted as his familiarity with the order of the plates increases.

As to the character of the descriptions, it is very evident, even without the acknowledgment in the preface, that they do not imply any acquaintance on the part of the author with the plants themselves. And this criticism applies with special force to such species

[1] The Mushroom Book, by Mina L. Marshall, New York, Doubleday, Page & Co., 1901, pp. 167. $3.00.

as *Russula emetica*, which demand the most accurate treatment. Nothing is said by Miss Marshall, any more than by the authors of "Among the Mushrooms," of the viscidity characteristic of this plant. In fact no mention of this character is made under the genus, and yet it is of the utmost importance in distinguishing between species. The author's final remark that *Russula emetica* "may readily be distinguished by its peppery taste," betrays ignorance of the existence of other red species that are also acrid. She seems, indeed, to share the too common conviction, that any acrid red Russula is *R. emetica*. Her treatment of the yellow Amanitas is dangerous. The final recommendation in regard to them — that those with a cup are edible — is most unwise, for its application may not be restricted by careless people — those most exposed to danger.

Another instance of inaccuracy is in the statement, in regard to the genus Hygrophorus, that the gills are decurrent. Although this is true of many conspicuous species, so that an incorrect impression is easily gained by an unobservant person, it is by no means universally or even generally the case. Examination of some common species, *H. miniatus*, *H. puniceus*, *H. conicus* and *H. chlorophanus*, for instance, will show an entirely different state of things. A few pages further on we are told under *Lepiota procera*, that "there is no poisonous species for which it can be mistaken, if one bears in mind" its structual characteristics. Has the author never heard of *Lepiota Morgani*, a dangerous species, which a tyro would easily mistake for *L. procera*? Another source of dissatisfaction with the descriptions is their extreme scantiness in some cases. The characterization of some genera is so slight as to amount to nothing at all; examples are Pholiota, Panaeolus ("black, ovoid spores, cap smooth and not striate, a fleshy stem"), Physalacria, ("small, simple, hollow, and enlarged at the apex"), Lachnocladium ("leathery plants covered with hairs") and Trametes.

The discovery of other inaccuracies and omissions of this kind must be left to the readers. One conspicuous tendency to misinform the uninstructed must however be mentioned. We all know the popular difficulty caused by Latin names. Recognizing this, the author, as her preface states, makes a point of marking the length of vowels and the place of accents. If her desire has been to record prevalent errors in the pronunciation of Latin, she has been remarkably successful. But she should have been surer of her ground

before setting models that, if they have any effect, will tend to confirm some illiterate usages and establish others quite new. Whatever may be said of generic names, which often, as in the case of the American pronunciation of *Coprínus*, permanently escape from the control of the laws of quantity, there will never be but one correct way to spell and to accent specific names when they are formed by Latin adjectives. In spite of Miss Marshall, then, and those whose usage she records, it is incorrect to say *rádicans*, *calópus*, *édulis*, *velútinus*, *prócera*, *caesaréa*, and *albídum*, just as truly it is incorrect to write *velutipas* or *cretaceous*. This sort of thing becomes ludicrous when for *Fávolus alveolaris* (the original spelling) is recommended *Favólus areolarius*.

The best thing about the book is the series of plates, around which the text is built. They are from the work of Mr. J. A. and Miss H. C. Anderson, whose colored photographs have been much admired. Only a few of these (*Armillaria mellea*, *Clavaria formosa*, *Boletinus pictus*, *Calostoma cinnabarinum*, for instance) fail to do justice to the plants. The rest are admirable. It is a noteworthy performance to have the three species of Calostoma, so long disputed, clearly differentiated on one plate. Yet the plates have been badly handled. They are not numbered, and some species are far removed from the places where they occur in the text.

It would be pleasant to find less to say in condemnation of a work like "The Mushroom Book." Its publishers are pushing it hard as the best book on the market. It is said to be selling well, and there is reason to fear that it is.

Two Additions to the Flora of Connecticut.— Last summer the writer found, in Hartford, the following plants which do not appear to have been previously reported as occurring in Connecticut:

Scleria pauciflora Muhl. A patch about a rod square on Kenney Park, Hartford, in dry sandy land sloping to the south.

Panicum sphaerocarpon Ell. In several places in Hartford, always in dry land. Appears to be quite common.— Hans J. Koehler, Hartford, Connecticut.

Botrychium matricariaefolium on Mt. Toby, Massachusetts. —In Mrs. Owen's interesting account of the ferns of Mt. Toby in the March number of Rhodora, it is stated that *Botrychium matri-*

cariæfolium has not been found there. I take pleasure in adding this species to her very complete list, having collected it at the summit of Mt. Toby, May 31, 1897, and May 30, 1898. The plants were growing luxuriantly for this small species, although most of them were not quite mature at that early date. I would add that I submitted the specimens to Mr. George E. Davenport, who fully confirmed my determination of the species.— T. O. Fuller, Needham, Mass.

A Correction regarding Barbarea praecox.— In my article in the March Rhodora, through an oversight, *Barbarea praecox* R. Br. was reported as new to New England. In fact it has been known near New Haven and Bridgeport for some years, as recorded in the Berzelius Catalogue and Bishop's List. The Waterford Station, however, extends its known range somewhat to the east. — C. B. Graves, New London, Connecticut.

Noteworthy Panicums in Connecticut.— The following notes regarding the occurrence, frequency and habitat of several Connecticut Panicums may help to determine their status in our flora.

Panicum barbulatum, Michx.— Is becoming better known in the State. It has been previously reported in Rhodora from southeastern Connecticut. Mr. C. A. Weatherby has collected it at So. Windsor. The species is frequent about Hartford and vicinity.

Panicum sphaerocarpon, Ell.— Is also frequent throughout the vicinity of Hartford; collections from Kenney Park by Hans J. Koehler and myself agree clearly with recent descriptions of the species. Mr. Weatherby has collected it at Manchester in typical form.

Panicum macrocarpon, Le Conte, and *Panicum agrostidiforme* Lam., are recognized additions to our flora.

Panicum xanthophysum, A. Gray.— Was collected in So. Windsor on July 12, 1900. (*Koehler*, *Withers* & *Driggs*). No other stations have been reported in the State. The plants were growing along a wood-road in almost pure sand. The woods had been recently cut off leaving a growth of scrub oakes, chestnuts, birches and other shrubs adapted to sandy soil in place.

This plant should be found elsewhere on the sandy plains and woodlands of the Connecticut Valley. There was nothing in the

soil or surroundings that would indicate any difference from many similar places that are found in the State.

It has been previously reported in Rhodora, as far south in New England as Southbridge, Massachusetts.— A. W. Driggs, East Hartford, Connecticut.

Juniperus communis, var. erecta, in Massachusetts. — In recent endeavors to make a complete list of the conifers growing without cultivation in the vicinity of Northampton, Massachusetts, I was fortunate enough to find a small colony of the tall Juniper described by Mr. Alfred Rehder in the Cyclopedia of American Horticulture, as *Juniperus communis*, var. *erecta*, Pursh. As this form is very rare in New England, it seems worthy of mention in Rhodora. It was growing in the same field with the common prostrate form, *J. communis*, var. *canadensis* Loud., but differing essentially in the manner of growth, the small trees being perfectly erect, some of them columnar, others spreading. The tallest one I saw was somewhat over ten feet in height, with a trunk-girth of ten inches. The leaves are longer than those of the low form, and not so thickly crowded upon the branches. In the fruit I could discover no difference. The distinguishing characteristics, then, were the longer and less crowded leaves, the much greater size, and the erect growth. — Emily Hitchcock Terry, Smith College, Northampton, Massachusetts.

[The common low juniper of barren pastures and hillsides in New England is treated by Mr. Rehder as *Juniperus communis*, var. *canadensis*. The tall form noted by Mrs. Terry is common further south, but, so far as we are aware, it is not otherwise known in New England. *J. communis*, var. *nana*, Loud. (var. *alpina*, Gaud.), to which the var. *canadensis* has often been erroneously referred, is thus far known in our limits only from the North Basin of Mt. Katahdin. — Ed.]

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C. E. Faxon, del.

Figs. 1 and 2, Quercus ilicifolia × velutina.

Figs. 3 and 4, Q. coccinea × ilicifolia.

Plate loaned by Bangor and Aroostook R. R.

West Monument Peak of Mt. Katahdin: East Peak at left, in the distance.

Rhodora

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A BOTANICAL EXCURSION TO MOUNT KATAHDIN.

JOSEPH R. CHURCHILL.

(Plates 25–31.)

DURING the first half of July, 1900, five members[1] of the New England Botanical Club visited Mount Katahdin, Maine. The mountain was a new collecting ground for all of the party, and some account of our exploration and collections will perhaps be interesting to the readers of RHODORA.

Twenty years ago Charles E. Hamlin communicated to the Appalachian Mountain Club a paper[2] describing Mount Katahdin, its infrequent but notable visitors, and the four possible routes by which they and others reached the mountain. The route taken by us, which was in great part the fourth one described by him, has since been much shortened by the extension of the railroad from Brownville through Stacyville, and doubtless other routes have been rendered more available since he wrote. Nevertheless Mount Katahdin is still surrounded by an immense wilderness, traversed only by lakes and rivers and by roads or trails, which in summer at least, are too rough to attract the tourist; and Mr. Hamlin's observations are true to-day as then, that the mountain "is so inaccessible that practically it is remote even to New Englanders. It is probably true that a greater

[1] Dr. George G. Kennedy, of Milton, Mass.; Merritt L. Fernald, of the Gray Herbarium, Cambridge, Mass.; J. Franklin Collins, of the Botanical Department of Brown University, Providence, R. I.; and Emile F. Williams and Joseph R. Churchill, of Boston, Mass.

[2] Appalachia, ii. 306.

number of eastern men now annually visit Pike's peak than penetrate to the Maine mountain, and a hundred Bostonians have been among the Alps for one who has climbed Ktaadn."

But though few, it was yet a distinguished company that we followed! To do more than refer to some who preceded us would unduly lengthen our report and repeat unnecessarily what they have themselves written, as well as Mr. Hamlin's account of them already referred to.

In the beginning was Charles Turner, Jr. of Boston, "the original describer of Ktaadn," who with guides and seven comrades made the ascent as early as 1804. His account is preserved in the collections of the Mass. Hist. Society. In 1836 came the excursion of Prof. J. W. Bailey, the father of our genial associate and botanist W. W. Bailey, of Providence. Two other distinguished geologists, Dr. Charles T. Jackson in 1837, and C. H. Hitchcock in 1861, made official visits. The enthusiastic eulogy of the mountain by Theodore Winthrop, scholar and soldier, was published after his death in 1861 under the title "Life in the Open Air." Dr. Edward Everett Hale with his friend Mr. Channing, made a partial ascent in 1845, an account of which was printed in the Boston Daily Advertiser. Then came Thoreau, in 1846, and the Rev. Joseph Blake, who, in 1856 discovered near the summit *Saxifraga stellaris*, var. *comosa*. And Dr. Goodale's visit, in 1861, was rewarded by the discovery of another Katahdin plant, *Carex rariflora*, which, however, in some way escaped detection by our party.

The morning of July 3, 1900, saw two of our delegation safely landed at Stacyville, a little country village on the Bangor and Aroostook R. R. We had had several introductory views of Katahdin from the car windows, but it was at the end of the little straggling road that leads from the station to the Post Office, where we stopped a few moments at the brow of the hill, that we first saw the mountain in his grandeur. Here truly was a picture for an artist. At our feet the hill sloped steeply to the West. On the horizon, twenty miles distant, was the great pile stretching along from North to South, crowned with its two peaks or summits and easily distinguished almost to the base from the lower ranges of hills that lay between. Below us stretching away to the mountain and the western horizon was the wilderness, almost unbroken save by the camps and trails of the hunters and logging men. This was the broad flat valley of the

East Branch of the Penobscot, which, eight miles away, flows peacefully southward past "Lunksoos," the camp on its hither shore which we should reach by night, and where we should await the arrival of the rest of our party. In all our trip I recall no other view of or from the mountain equal in beauty to this one from the edge of Stacyville. Here they pointed out to us the great abyss in the Eastern slopes of the mountain, into which above debouched the "North Basin" and the "South Basin," the latter our destination and ten-days' camping site. From the south end of the range there extended toward us the long gaunt and rocky spur tipped by Pomola, the whole spur curving about and embracing the South Basin much as Cape Cod surrounds Massachusetts Bay. Here we saw the southeastern exposure. At our camp we were upon the other, or inner, side. Of course we were much interested in making out these points, and in observing the great patches of snow that still lay there upon the steep slopes.

Our guide, Capt. Rogers, met us at the station with a two-seated buck-board, to take us with our baggage to Lunksoos. No summer boarding-house affair was this buck-board. It was built for substantial service over roads the roughness of which we were now to experience, but which accurately to describe requires that this sketch shall be illustrated with one of the views of a sample passage en route (pl. 26) taken by the artist to the expedition.

Outside the town, at the foot of the long hill I have mentioned, beside a stream where recently had been the inevitable saw-mill, we had our noontide lunch amid *Mitella nuda*, *Ranunculus septentrionalis*, a profusion of *Linnaea*, and other plants common enough here, but very welcome to the unaccustomed eyes of Bostonians. Here also we made our first collection from the Maine soil, a tall *Geranium* which proved to be the *G. pratense*, L., of Northern Europe. We had noticed it by the roadsides as we rode through Stacyville, where it is evidently well established. It is like our *G. maculatum*, but much larger and coarser; the flowers are deep blue-purple and the leaves are cut into very narrow pointed lobes like those of *Ranunculus acris*. The upper parts of the plant are glandular-hairy. Mr. Fernald has also observed it elsewhere in the State, and it is doubtless entitled to recognition in future editions of the Manual.

Just beyond this stream, where the fields come to the forest, a turnpike gate is appropriately set across the road; and as we closed it be-

hind us we shut out our nearest post office, our railroad station, and civilization, for two whole weeks. We have now, since our return, no difficulty in identifying this point also as that described by Hamlin in his paper (p. 322) where "the way turning directly west .... the Third of the Sixth (now the plantation of Stacyville) changes from a smooth highway to the worst of cart-tracks." My note for the afternoon says: "We had a rough ride on the buck-board, but it was mostly walking." We walked both for comfort and to botanize.

There is, after all, little collecting to be done (unless one is looking for mushrooms) in the sombre shades of a Maine forest, so we easily kept ahead of the horses, and it was long before sunset that we emerged in a clearing upon the river bank at the "Hunt Place." As it was now raining we sought shelter in the dilapidated old house and waited for the wagon to come up. This same "Hunt Place" was visited by Thoreau, who, on August 1, 1857, came down the river in his canoe, and called at the house. He says "We found that we had camped about a mile above Hunt's, which is on the East bank and is the last house for those who ascend Katahdin on this side .... We stopped to get some sugar, but found that the family had moved away, and the house was unoccupied, except temporarily by some men who were getting the hay. They told me that the road to Katahdin left the river eight miles above; also that perhaps we could get some sugar at Fisk's, fourteen miles below. I do not remember that we saw the mountain at all from the river."

We too found the Hunt Place as deserted and desolate as did Thoreau more than forty years before, but "the last house for those who ascend Katahdin on this side" was now a mile and a half further up the River, at Lunksoos.

The cart-way along the edge of the river was rougher than the "tote road" just passed, but we were now bundled up in rubber coats and so packed into the buckboard in the rain, that we had to submit to the pounding, which we had before avoided by walking. Capt. Rogers told us that his camp was named from a mountain still further up the river. Thoreau spells the name of this mountain "*Lunxus*," and says the word means "Indian Devil." Whether appropriate or not to the neighboring mountain, the appellation thus translated is wholly out of keeping with the quiet rural beauty of this little riverside home; unless indeed it is intended to suggest the character of the roads by which the paradise is finally reached.

AT THE CAIRN, WEST PEAK, MT. KATAHDIN.

"We had a rough ride on the buck-board, but it was mostly walking."

The camp comprised a two-story frame house with a barn, and at a little distance a sylvan dormitory or hunters' lodge of two stories, built of logs placed perpendicularly and containing eight or ten rooms. The woods were cleared away and a green but "stumpy" lawn sloped gently from the house to the river bank a few rods below. The thick forest bordering the opposite bank of the river was reflected in the smooth dark water, though above and below were rapids, and the picture was not there so restful. A wire cable with its primitive ferry-boat, connecting the banks, added a picturesque feature to the landscape. While Katahdin, as Thoreau said, was not visible from the river, yet from the little observatory upon the roof there was a good view, though much obstructed by clouds about its head, and (it must be confessed) by other clouds about ours; for there we found that the black flies were particularly numerous and aggressive. So we did not much frequent the roof-top, but made ourselves busy comfortable and at home in many ways below.

The next day, July 4th, we transferred almost all the contents of our neatly packed trunks to large rubber or canvas bags and in other ways mobilized our forces. We watched the swallows building their nests along the eaves of the low piazza, quite within reach. In a canoe ride up the pretty river at sunset we made our first acquaintance with a moose who was feeding in a wet meadow. He soon made off into the woods, however, looking upon us undoubtedly, in common with all mankind, as his foe. He could not know that we were not collecting moose! We walked back down the river road to Hunt's again, and along the bank collected *Carex torta*, *C. arcta* and *C. tribuloides*, vars. *turbata* and *reducta*. In the woods we found *Habenaria Hookeriana*, *Viola Selkirkii*, *Pyrola chlorantha*, and *P. asarifolia*.

Tuesday evening, July 5, brought Collins, Fernald and Williams. Our party was now complete; and, after they had gone through the same demoralizing process of dumping blankets and clothes from the open and luxurious trunks to the dark cavernous recesses of canvas bags, we were ready for the start the next morning.

The Wassataquoik River drains the Northeast slope of Katahdin and empties into the East Branch above Hunt's. It is at this season a shallow, brawling mountain stream, and before the despoiling hand of the lumberman, followed by the usual visitation of forest fires, it and the valley through which it flows, must have been a scene of

surpassing beauty and wildness. Now, while much of its former beauty remains, yet, in its ascent, we travelled the greater part of the way through an open rough and rocky country, from which the protecting forest had been almost entirely removed by the axe and by fire. Thus "progresses" everywhere the Maine wilderness. Some big primeval woods through which we climbed, well up Katahdin's side, hitherto saved by their remoteness and inaccessibility, were, it was said, already doomed, and the trunks of these black spruces were this winter to follow their mates down the yearly diminishing current of the Wassataquoik to the saw mills. Some benefit however, from all this havoc had we in the logging camps, which derive their existence from this industry and which, at intervals each of several miles along our path, afforded us rude shelter and hospitality on our two days' journey to our own "Camp Kennedy."

Two buckboards took us by the little wire ferry across the East Branch. At the outset we had a particularly exciting and boisterous passage through the low wet bottom lands which lay along the west bank. It was wet and miry, and as the mire was invariably much deeper on one side than the other, the center of gravity of our wagons was often dangerously near getting outside the base, and the woods rang with our shouts of alternate laughter and terror dependent upon which side at the moment was up and which down, ours or the other fellow's.

Walking was here out of the question; there was too much water; so we stuck to our seats, observing the driver's direction, "Just get your heft under you, then set on it"; but we rejoiced when after a mile we reached the dry land. Passing over the ridge between the two rivers we struck the Wassataquoik at Dacey Dam. Thence our path lay along the left bank of the river, very gradually ascending. At noon we lunched at "Robar's," and before sunset, after some steeper grades and climbs, we reached the "Bell Camp" at the head of navigation for wheels.

The log house was prettily situated above the steep river-bank. We had come that day about sixteen miles, and had acquired good appetites. There were trout in the river, and some of the party, instead of botanizing, undertook to provide for supper, with very good success. A notable collection was made en route in *Listera auriculata*, which grew in low ground by the river.

Before stretching ourselves, some in bunks and some on the

equally comfortable log floor, we went through a most salutary and disciplinary exercise in recovering from the depths of those bags just the few things that we needed for the night, while the others slid to the bottom. The sense of touch was the only one involved in the transaction, but at these times a feeling akin to despair took possession of us, wondering how many of our worldly possessions there would remain to us the next night and the next.

Here, early the next morning, Saturday, July 7, we crossed and left the Wassataquoik, and ascended a narrow valley through which flows a tributary brook. After an astonishing ford of the rocky rushing river by the horses and buck-boards, our camp equipage was transferred to a "jumper," or rough lumber sled, which, drawn by two horses, followed us to the "McLeod" Camp, two miles beyond. Here one of the mountain thunder storms, which were afterwards of almost daily occurrence, overtook us, and we were glad to get under cover of the rude cabin.

Striped squirrels, "chipmunks," ran about in the cabin and upon me as I sat in the open doorway. We were grieved to hear afterwards that they had all been slaughtered. Poor tame little creatures! They get in the way of man, the bigger animal; they eat some of his pork and beans; straightway they are classed as pests, and become a target for the revolvers of cruel hunters and guides, who indeed seldom wait even for this excuse for gratifying the passion for slaughter. We saw many deer throughout the trip and wondered how men could get pleasure in slaying the beautiful and harmless creatures.

At McLeod's began the real ascent. Even the horses and the jumper stopped here. To our camp in the South Basin, there was only a "trail" through the forest, with the blazed trees by which to follow it, with care. Our lithe and sturdy guides made the climb more easily I think than we, though they carried most of the baggage, sometimes eighty pounds apiece, on their backs. The length of this stage was fully five miles, though I have an impression that these same guides diplomatically assured us that it was but three. When we reached Depot Pond after many hours of climbing, we fondly imagined that we were near the top, but when we came down over the same trail, we found this pond a long way from camp!

It was now again raining; we were wet, and the air and the mossy earth and forest and everything about us was drenched; yet when at

last we stumbled upon our long-sought Camp Kennedy, it was not without a feeling of surprise, to find it there, imbedded in the apparently unending forest. We were looking first for "scrub" perhaps; or a limit of trees; something in the nature of a clearing. Yet, newly constructed from the unpealed spruce logs that grew on the spot, with low flat black roof, it seemed part of the forest itself and quite a normal growth there. A most artistic chimney upon one side of the structure, though made of green spruce bark in keeping with the rest, betrayed more clearly its artificial character; and the smoke arising therefrom gave promise of a fire, of comfort, and of dry clothes within; an invitation we were not slow in accepting. The inside was much like the outside. It was a single room about twenty feet square, with flat roof about nine feet from the floor on one side, sloping to perhaps seven on the other. The floor was made also of smaller logs, laid unhewn upon or just above the ground, like a corduroy road and about as level. There was a door about two feet wide in front, facing South, and opposite to a window with a glazed fixed sash about three feet square.

On one side the logs were interrupted for a space in the middle, to take in the fireplace which was built outside and of stones, but the chimney itself was built down close to the fire of thick spruce bark; and, though exciting our instant admiration as a work of art, became from day to day more inflammable and dangerous, and was, despite the humidity of the climate, several times on fire. Such construction would never have been approved by our Boston Inspector of buildings. Opposite the fireplace, in the corners, were two bunks raised perhaps four feet from the floor and built of small trunks or poles; and beneath them, on the ground, two more bunks. The bedding was spruce twigs, imbricated. For furniture we had a table made of spruce bark, with sections of the logs for seats. I dare say that I have described too particularly a typical log cabin of the Maine woods, but it may be new to some of the readers of Rhodora, as it was to some of us.

Except the glass sash, the roof was the only part of our house which was imported, and we had much trouble with it, though perhaps not for that reason. It was made of rolls of tarred paper slightly overlapped; and the pitch, but two feet in twenty, was so slight that frequently the rain trickled through into our sleeping nests and upon our dryers, instead of going off by the eaves as it shoul

Timber-line above Chimney Pond, Mt. Katahdin.

It was but a frail barrier between us and the clouds, when some of the deluges came at night, and then we were glad we were under the trees and not on the exposed lakeshore near by, where the wind roared and would surely have torn our paper roof to tatters.

We were now well up in the South Basin on the east slope of Mount Katahdin, at an altitude of about 3000 feet. This Basin may be roughly described as bounded west and south by the steep wall and uppermost slopes of the mountain itself, north by a spur extending eastward from the mountain between the so-called North and South Basins, and southeast by Pomola, connected with the rest of the mountain by a most remarkable arm or promontory, a narrow precipitous and desolate mountain wall. The monument or southern peaks, which are the highest, and therefore the summit of Katahdin, are precisely where this narrow wall separates from the broad upland.

At the foot of the concave and ragged slopes of Pomola and this narrow connecting ridge, in front of the Camp and but a few rods away, was a little alpine lake, bordered in part by a narrow bog and in part by giant boulders, sometime parcel of the heights above. About this tarn, Chimney Pond, were collected many of the good things for which we came, notably *Carex saxatilis*, concerning which Mr. Fernald has elsewhere [1] given a particular account of his investigations and conclusions. In its icy waters, just below its outlet, grew *Salix balsamifera* and *S. phylicifolia*.

Along the brook, which flowed by the Camp, we found flowering *Viburnum pauciflorum*, and *Pyrola minor* which we coaxed into flower before we departed.

Sunday, July 8, the day following our arrival, was a day of idleness enforced by the continual downpour of rain though it is recorded that neither weather nor want of appetite interfered with our keen appreciation of dinner, which included a first rate stew of beef, potatoes and onions served in porringers. Dessert, flour biscuits with maple syrup, in tin plates. It was probably before this meal that we improved our view of the great cliffs and of the summit by cutting down some fir-balsam trees which grew beside the camp.

The next morning, July 9, gave promise of no better weather, but something was to be done, rain or shine, and Fernald, Collins and

[1] Rhodora, iii. 44.

the writer started up the rocky bed of the brook to explore. After a mile or more we were out of the woods, the brook and its bed disappeared, and we found ourselves ascending the steep slope of the mountain (which on this side forms a wall of the Basin), and absorbed by the alpine plants which grew profusely about. I think the rain still continued at intervals, but it made no difference They were April showers which only made the flowers brighter and more beautiful.

The Heaths were conspicuous and almost all in flower. *Cassiope* was there with delicate mossy stems and white flowers. The rosy nodding flowers of *Bryanthus* were profuse and attractive. *Loiseleuria* was perhaps as abundant, but less conspicuous. There were on the ledges the curious convex tufts of the *Diapensia*, with even surface, but with large white flowers projecting, like pins and ornaments from a pincushion. Of the Vacciniums we collected *V. Vitis-idaea*, *V. uliginosum* and *V. caespitosum*. We found *Viola palustris* here and at other points, always with flowers white.

Near the top of the ascent or slope we stopped to drink from a cold spring. Here we collected *Lycopodium sitchense*, and *Salix herbacea* with the little staminate catkins just in flower. *Alnus viridis*, too, was just expanding its staminate catkins. But as usual the Alpine *Rhododendron* had gone by thus early.

These slopes, up one of which we thus climbed, come to a distinct termination and are succeeded, at a step, by a nearly level upland grassy or sedgy plateau between the North and the West Peak or summit. The edge of this plateau and the adjoining upper slopes were fairly carpeted with *Arctostaphylos alpina*, which was very full of green fruit. It was not late when we reached this "Saddle," and we could easily have gone to the summit, but we preferred to take another day for that. So we ate our lunch, wandered about over the great plain, enjoying the view and the strong fresh wind which came out of the West, and made our way down a neighboring slope, which had been recently converted into a "Slide," and thence by way of the brook, seasonably and triumphantly to Camp.

The next morning, Tuesday, July 10, some of the party thought that they discovered assuring signs of fair weather and started for the summit, but toward noon it rained as hard as ever, and the afternoon was spent in camp. With our load of plants already collected there was plenty there to keep us busy.

Negative loaned by Prof. L. H. Merrill.

SOUTHERN EDGE OF THE TABLELAND, MT. KATAHDIN.

THE SADDLE FROM NEAR THE CHIMNEY, MT. KATAHDIN.

Wednesday, July 11, we were more fortunate. We got away early, followed the brook as before, but left it and ascended to the Saddle by way of the Slide, which was on the whole easier than working and climbing through the rocks and scrub on the adjoining ledges and slopes. From this point, the top of the west wall of the Basin, the ascent is wonderfully easy. The great Tableland stretches away to North and South, very irregularly bounded by the various ravines and precipitous slopes, and often covered with loose rocks and boulders, but rising very gradually to the two peaks.

We were soon widely scattered over this lawn, looking at the grand view and trying to name the various lakes and mountains which made up the panorama, and collecting a few grasses and other plants; but we finally got together at the stone cairn at the top about midday. We were here more than 2000 feet higher than our camp, whose location we could readily discern; and according to the most accurate survey, 5215 feet above sea level. It was then clear, though clouds were beginning to drive in from the West, and the view in all directions was very beautiful. The numerous large lakes, and the rivers, too, whose courses were easily traced, gave a variety to the landscape which is wholly wanting in the view from the summit of Washington.

Here at the cairn, marking this summit, ends the great mountain plain, up which we had comfortably walked, and the end is very abrupt. Looking East, we are close to the ragged edge of the fearful precipices which fall hundreds of feet to the little lake at our camp below. Turning but a quarter-circle to the South, the drop was almost as abrupt; save that between the two descents is the dizzy path which leads down and along the narrow ridge over the Chimney to Pomola, here making off from the mountain, first to the East and then at a sharp angle to the North; embracing, as I have said, the South Basin in its great curve. It was a scene of desolation! Were it not that the granitic formation forbade that conclusion, we might think ourselves on the ragged edge of the crater of an extinct volcano. The rocks were broken and disintegrated.[1] The cliff

[1]Prof. R. S. Tarr, in his paper on "Glaciation of Mount Ktaadn, Maine" (Bull. Geol. Soc. Am. xi. 441), compares these steep walls, only recently exposed to the fierce action of frost, water and wind, with similar steep valleys in Greenland, in which glaciers now exist, and from this and other significant evidence he concludes that these Katahdin Basins were until recently the beds of local glaciers.

seemed ready to fall of itself, it was so rotten; and this being remarked, our guides, as cool of nerve as they were agile and strong in body, proceeded, standing upon the uncertain and dizzy brink, to detach great masses which we heard dash and bound from cliff to cliff, carrying hundreds of other portions with them in their wild descent. The spectacle was more safely witnessed by our camp attendant below, who said the rocks did not rest till they reached the little belt of shrubbery above the lake.

We had now again crossed the path of Thoreau, who, in September, 1846, ascended the mountain from the west side, though by reason of bad weather he did not get quite to the summit. Some of his observations are so appropriate and accurate that I venture to quote them: —

"At length," he says, "I entered within the skirts of the cloud which seemed forever drifting over the summit, and yet would never be gone; but was generated out of that pure air as fast as it flowed away; and when, a quarter of a mile farther, I reached the summit of the ridge, which those who have seen in clearer weather say is about five miles long, and contains a thousand acres of table land, I was deep within the hostile ranks of clouds, and all objects were obscured by them.

"The peculiarities of that spacious table land on which I was standing, as well as the remarkable semi-circular precipice of basin on the eastern side, were all concealed by the mist.

"The tops of the mountains are among the unfinished parts of the globe, whither it is a slight insult to the gods to climb and pry into their secrets, and try their effect on our humanity. Only daring and insolent men, perchance, go there. Simple races, as savages, do not climb mountains,— their tops are sacred and mysterious tracts never visited by them. Pomola is always angry with those who climb to the summit of Ktaadn."

Two of our party (Fernald and Collins) decided to risk further the anger of Pomola by scaling the narrow and difficult path along the ridge over the Chimney and thence returning home over the brow of Pomola, with a guide. We watched them from the summit, and it was surprising how far away we still saw them through the clear air; and we exchanged signals when they looked no bigger than flies. Pomola launched no thunderbolts upon them that day and they reached camp safely after a long and precipitous descent. The

POMOLA FROM THE TABLELAND, MT. KATAHDIN.

GREAT BASIN FROM NEAR THE CHIMNEY, MT. KATAHDIN.

North Basin of Mt. Katahdin from Depot Pond.

South Basin of Mt. Katahdin from Depot Pond.

return of the rest of the party was by the Slide again, but on leaving the summit we kept together along the edge of the Basin, partly to watch the Pomola delegation.

Now we all knew that somewhere near the summit "on wet rocks" there had been collected by Scribner in 1873 *Saxifraga stellaris*, var. *comosa*. So the eyes of both sections were now particularly engaged in discovering the hiding places of the little stranger, whose only station in the Eastern United States was near where we then were. And to Williams is due the credit of first finding her, and of tearing her ruthlessly from her damp bed under the dark rocks. Being thus advised, however, the others soon found victims in similar unwholesome retreats and though the supply was limited, our Club and private herbaria at least will have a satisfactory representation of the rarity.

The daily rain now began to fall and the summit and Pomola were as invisible as they were to Thoreau, but we had done with them and were ready to return to shelter after a most satisfactory day.

Friday, July 13, we followed two guides and a trail through the woods and over the intervening spur, into the North Basin. We found after struggling through the "pucker-brush" which formed an almost impassible barrier before it, or across the great opening to the East, that it was a most interesting place. The altitude of its floor was about 500 feet higher than that of the other Basin; and there were no trees except in the depressions, where as usual the scrub made progress difficult. It was a great open amphitheatre, bounded, except on the East, by a series of perpendicular almost inaccessible cliffs which rose to the summit plateau. These cliffs were more regular, and not so high nor so utterly desolate and suggestive of the action of violent forces, as those which towered over our little camp in the South Basin. From their base the ground sloped quite gradually and uniformly to the narrow lake, perhaps a third of a mile long, which extended partly across the great eastern opening. To travel about and to pass across this little sheet of water was very difficult on account of the rocks and the jungle of low spruces and dwarf birches and alders which surrounded it. Beyond, the floor was carpeted with *Cornus Canadensis*, the common alpine Vacciniums and Willows, and with spreading mats of the Alpine Bearberry heavily laden with fruit. *Comandra livida* was not uncommon, but it did not emulate the example of its prolific neighbor, and as usual confined itself to a very meager production of flowers and fruit.

A wet slope between two of the cliffs gave us *Castilleia pallida*, var. *septentrionalis*, *Juniperus communis*, var. *nana*, *Carex atrata*, var. *ovata*, *Avena striata*, *Agropyron violaceum*, *Cardamine bellidifolia*, *Potentilla fruticosa* and *Galium Kamtschaticum*.

Monday, July 16, we broke camp and started upon our return down the mountain by the same path. I do not recall that on that day we had rain before late afternoon, but certainly on the day following, when we rode from the Bell Camp to Lunksoos, there came a flood; and we were compelled again to remain in the open wagons rather than wade through many pools and swollen brooks. In skirting the edge of the "Depot Pond," and at some other places, we collected some notable Carices; and along the gravelly bank of the Wassataquoik we saw much *Prunus pumila*, quite unlike our Sand Cherry of Massachusetts, *P. cuneata*, with which it has been confused.

Tuesday night we reached Lunksoos, which now seemed a most luxurious abiding place. Thence by way of Stacyville, through farewell torrents of rain, submerged forests and corduroy roads, our little party dispersed, in the diverse directions in which pleasure or duty called.

A COMPARISON OF THE FLORAS OF MT. WASHINGTON AND MT. KATAHDIN.

Emile F. Williams.

Mt. Katahdin lies 161 miles northeast of Mt. Washington. The latitude of its highest summit, the West Peak, is 45° 53′ 40″. The latitude of Washington is 44° 16′ 25″, a difference of 1° 37′ 15″, about 112 miles. The altitude of Mt. Washington is 6300 ft. above the sea; the most reliable determination of the altitude of the West Peak of Katahdin, made by Prof. M. C. Fernald, gives it a height of 5215 ft. above sea level. Both mountains have a similar geological formation, almost entirely granitic.

As might be expected, the general conditions for plant life are very similar on these mountains. Both are surrounded by vast areas of wooded country, both are abundantly watered by innumerable springs and rivulets, which well up out of the ground at very great elevations and both ranges are sufficiently high and extensive

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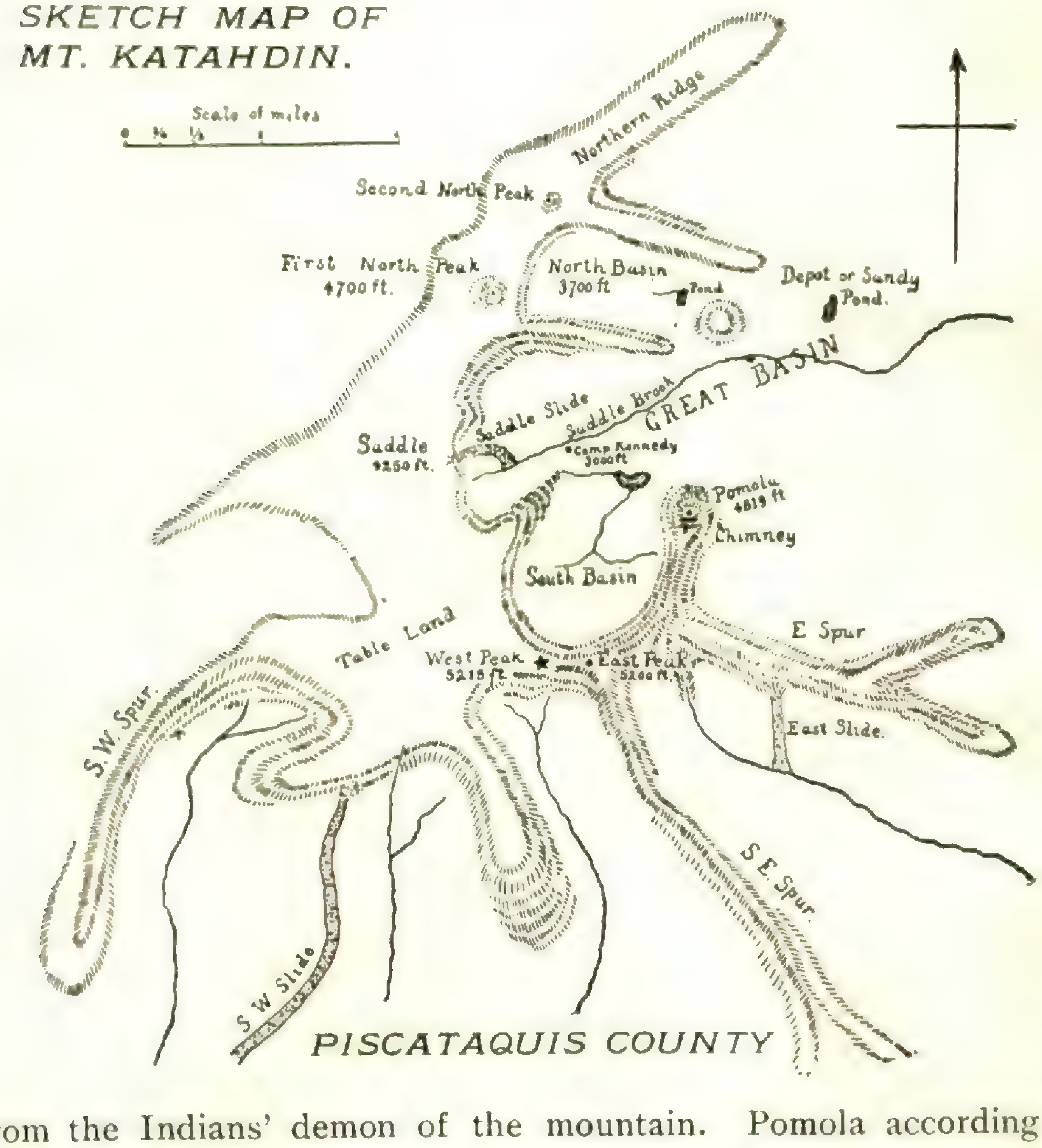
HEAD OF NORTH BASIN, MT. KATAHDIN.

to possess a considerable subalpine and alpine region. On the summit ridges of both the botanist can revel in miles of the stony wastes and upland bogs that yield the rare treasures of high mountains, while his spirits are uplifted every time he raises his eyes from the ground by the soul stirring scenery displayed before him on all sides. Indeed, if the botanist be a mountain lover as well, — and what botanist is not, — he will prefer Katahdin for its ruggedness, its summits as yet undefiled by the handicraft of man, and its magnificent panorama of numberless lakes and streams, in which last feature it is conspicuously superior to Washington.

While the general conditions of both mountains are alike, Katahdin differs from Washington in many minor particulars. It is distinctly more arctic, for one thing, although it is only 112 miles more northerly. The timber line, which on Washington averages 4000 ft. altitude, barely averages 3100 ft. in the Great Basin of Katahdin and 2200 ft. on the southern slopes; this last being partly due, however, to their excessive steepness. The entire summit ridge in fact, while in the greater part of its length somewhat flat, falls away precipitously on all sides. There being no easy grade to the summit of Katahdin, like the Fabyan ridge or the Crawford range of Washington, the flora of its slopes is found in scantier patches, the plants themselves being smaller and more stunted than on the latter mountain. Prevalent as are the fogs and abundant as is the precipitation on Washington, Katahdin appears to be an even wetter mountain. This is probably due to its isolation. It lies alone in the vast Maine wilderness, except for some ranges of lesser mountains to the North and Northwest, so that clouds form freely about its summits. We can generally count on good collecting weather on Washington in July; on Katahdin, not until August according to the guides. We were on Katahdin from July 8th to July 17th and it rained every day but one. During a ten days' stay in the immediate neighborhood, in February of this year, the mists gathered over the summits every day, pouring snow into the ravines, just as they had poured rain over us last summer. The local guides assured us that snow reaches a depth of eighteen feet in the Great Basin, where our camp was located, — truly an arctic condition of things!

The summit ridge or backbone of Katahdin, as will be seen by a glance at the accompanying map, is shaped like a huge fishhook, the shank of which lies toward the Northeast and the opening of the

hook to the east. The two highest summits, the West and East Peaks, which differ in altitude about 15 ft., and are about one third of a mile apart, are at the base of the hook. The point of the hook, which turns north from the East Peak is terminated, first by a little tower-like crag called the Chimney and then, across a deep and narrow notch, by a precipitous peak called Pomola (4819 ft.) named



from the Indians' demon of the mountain. Pomola according to them is responsible for the bad weather with which the intruding mountain climber is assailed, this being the divinity's method of showing his displeasure at the invasion of his domain. Beyond the West Peak (5215 ft.) the ridge curves in an arc of a circle to the North Peaks, of which there are two close to each other. The depression between the West Peak and the North Peaks (4700 ft.) is called the Saddle, the lowest part of which is at 4250 ft. altitude. The Tableland lies between the West Peak and the Saddle, and is

an almost plane surface, inclined to the northwest at an angle of from five to seven degrees and having a length of a mile and one half, with an area of more than five hundred acres. It is a botanical garden of the most generous proportions.

Beyond the North Peaks, the ridge continues at a lower level for three miles and then it drops abruptly into the foot-hills, which are heavily wooded. The entire length of this ridge above timber land, is eight and one half miles. The inside of the hook forms the Great Basin, an elevated ravine at an average altitude of about 3000 ft., three miles long from North to South by one and one half miles wide from east to west. Under Pomola and the East and West Peaks, the walls of this Basin are well nigh vertical and form a smaller amphitheatre of sublime proportions, with a northern exposure, called the South or Chimney Basin within which is a small lake called Chimney Pond. Near the mouth of the Great Basin on its west side, two secondary ridges three quarters of a mile apart, which abut on the main ridge on either side of the North Peaks, form an elevated ravine with a southeastern exposure called the North Basin. The floor of this North Basin is barren of timber, its elevation, about 3700 ft., is several hundred feet greater than that of the South Basin and the conditions for plant life are similar to those on the summit ridge.

The back wall of this ravine is very wet and being exposed to the sun and less steep in most places than the back wall of the South Basin, it afforded us almost the best collecting ground we found on the mountain.

It is not as yet possible to make an accurate botanical estimate of the flora of Katahdin. The range is so vast that many seasons will be required before we know approximately the bulk of its flora. Our survey embraced only some of the main features of the mountain; the two Basins and their walls, the summit ridge from the Saddle around to Pomola, including a part of the Tableland with the West and East Peaks, and a limited area about the North Peaks. We could do nothing on the vast outer slopes of the hook, nor on the long Northern Ridge.[1] The roughness of the work and the great

[1] A large basin, as yet little known, has been seen by explorers from the Sourdnahunk range (to the northwest of Katahdin). This basin lies in the western wall of the North Mt., and is reached with extreme difficulty from above. Those who have explored it report a deep abyss surrounded by precipitous walls, and with a pond in its floor fed from above by a high waterfall. Owing to lack of definite data this basin is not represented on the accompanying map.

distance from a base of supplies, make a thorough botanical exploration of the whole mountain a labor of many years. We noticed however with interest, on the one hand the presence of many plants not found on Washington (several being species new to Maine) and, on the other, the unaccountable absence of species common enough on that mountain. It is more than probable that most of these will turn up in time. Our work was confined to the alpine and sub-alpine region of the mountain and it is this region only that we consider.

Perhaps the most notable plant peculiar to Katahdin is *Saxifraga stellaris*, L., var. *comosa*, Willd. This was found in Joseph Blake's and in Scribner's original stations, the latter in the interstices of great rocks north of the West Peak, the former in the notch between the Chimney and Pomola, where a few specimens only were collected by Mr. Fernald.

On the eastern slope of the Saddle, Mr. Fernald collected an immature *Epilobium* which appears to be with scarcely any doubt *E. anagallidifolium*, Lam. In the North Basin we collected an abundance of *Comandra livida*, both in flower and fruit. This has been found hitherto in New England only on Mt. Mansfield in Vermont and on Saddleback and Abraham in the Rangeley Lakes country. Singularly enough a very dwarf *Kalmia angustifolia*, with flowers of the brightest hue, abounds there. On Washington we have never seen it, except on the foot-hills. We also found in the North Basin, *Larix Americana*, a few trees, absolutely prostrate, but spreading over ten or twelve feet scarcely six inches from the ground. *Juniperus communis*, var. *nana*, Loud. (the first station in the eastern United States) and *Eriophorum alpinum* are on the ledges of the back wall. This back wall, in fact, was especially rich in lowland plants, which owing to the dampness and southeastern exposure attain here a remarkable elevation. Many of these were found at 4000 to 4500 ft. altitude. We noticed among the members of this adventurous colony: *Lycopodium clavatum*, *Osmunda Claytoniana*, *Pteris aquilina*, *Carex leptalea*, *Carex communis*, *Carex flava*, *Danthonia spicata*, *Smilacina racemosa*, *Andromeda polifolia*, *Aster umbellatus*, *Aster Radula*, *Aster acuminatus*, *Diervilla trifida*, *Potentilla fruticosa*, *Prunus Pennsylvanica*, *Prunus Virginiana*, *and Viola Selkirkii*. It seemed strange indeed to find these plants in company with *Diapensia Lapponica*, *Bryanthus taxifolius*, *Arnica Chamissonis*, and *Epilobium Hornemanni*.

Three interesting *Carices* we found on Katahdin, and although two were well below the alpine region, we cannot pass them in silence: *Carex Grahami*, Boott, the second reported station in the United States, and *Carex Katahdinensis*, of Fernald, a new species. Both of these were found at Depot or Sandy Pond, a tiny mountain tarn, at an elevation of possibly 2500 feet. The other noteworthy *Carex* as *C. saxatilis*, L., at Depot Pond, but more abundant by Chimney Pond, in the South Basin. These are its first known stations south of northern Labrador.

We failed to find on Katahdin the beautiful large flowered form of *Houstonia caerulea*, which is so conspicuous on the summit ridge of the Presidential range. *Oxyria digyna*, likewise, was absent, also *Carex capitata* and *Carex capillaris*. Why *Geum radiatum*, var. *Peckii* did not greet us with its large yellow flowers is hard to understand as it is very common in the White Mountains. *Potentilla frigida*, also, remained peculiar to Mt. Washington and Mt. Lafayette, nor did we find *Rubus Chamaemorus*, *Silene acaulis*, *Saxifraga rivularis*, *Sibbaldia procumbens*, *Eriophorum vaginatum*, *Isoetes lacustris*, *Rhinanthus Crista-galli*, and *Angelica atropurpurea*.

One noteworthy plant, *Arctostaphylos alpina*, which is with rare exceptions sterile on Mt. Washington, although it flowers freely, we found on Katahdin in several stations, loaded with heavy clusters of ripening fruit. This was indeed a glad sight to botanists accustomed to spend many hours, turning over the creeping shoots in search of one single berry.

The usual high mountain plants, *Cassiope hypnoides*, *Loiseleuria procumbens*, *Rhododendron Lapponicum*, *Bryanthus taxifolius*, *Arnica Chamissonis*, *Diapensia Lapponica*, and many other old friends, greeted us in their freshest apparel and these showy beauties elicited the greatest appreciation from our guides, who although familiar enough with the mountain, had hitherto been blind to their presence. Our more sophisticated spirits were far more elated by the humble *Gnaphalium supinum*, the lowly *Comandra livida* and the shy little *Saxifraga stellaris*, var. *comosa*.

"The daintiest last, to make the end most sweet."

THE VASCULAR PLANTS OF MOUNT KATAHDIN.

M. L. Fernald.

(Plate 32.)

Among the numerous scattered accounts of Katahdin there are few detailed lists of the plants. In fact, many who have written of the mountain seem to have noticed only a few common species, while others have contented themselves with vague or unfounded generalizations. Besides those who have written on Katahdin there are, of course, a number of people who have there picked up plants of more or less interest. But so far as is now known to the writer the results of only two serious botanical trips are unrecorded. These will be discussed in the following summary which attempts to show our present knowledge of the more important botanical explorations of Mt. Katahdin.

In 1837, Prof. J. W. Bailey published in the American Journal of Science (xxxii. 20–34) an account of his geological studies on the mountain. Several plants were enumerated, mostly from the base or the lower slopes.

Thoreau, whose vivid account of the mountain can be appreciated only by those who like him have pulled themselves "up by the side of perpendicular falls of twenty or thirty feet .... ascending by huge steps, as it were, a giant's stairway, down which a river flowed," noted, in 1846, many of the common species, but the unpropitious weather prevented his exploring extensively.

In August, 1847, George Thurber, the distinguished agrostologist, Aaron Young, a student from Bangor, and John Emerson of Glenburn, Maine, ascended the mountain and made extensive collections. No report of their results seems to have been published, though a large number of specimens, both from Thurber and from Young, are in the Gray Herbarium. Their route seems to have been the old one by the Wassataquoik valley, thence to Katahdin Lake and up the East Spur. Though they brought back the first representative collections of Katahdin plants they apparently got none of the rarer species, and the data on their labels are unfortunately incomplete.

"Parson" Keep, the veteran guide and independent pastor of a faithful flock, whose unique but intimate knowledge of Katahdin and the flora of northern Maine was transmitted to no successor, knew

the plants in their alpine homes. Upon his observations and guidance depended many of the results accomplished by the Scientific Survey of 1861, but apparently no more definite record exists of his botanical knowledge of the mountain.

Joseph Blake, whose Fourth of July, 1856, was celebrated by the discovery of *Saxifraga stellaris*, var. *comosa*, previously unknown south of extreme Arctic America, apparently left no detailed account of his trip, though his herbarium is preserved at the University of Maine, and many scattered Katahdin records are based on his plants.

In 1861, during the Scientific Survey of Maine, two parties visited Katahdin. The first of these, with "Parson" Keep as guide, consisted of C. H. Hitchcock, G. L. Goodale, A. S. Packard, Edmund H. Davis, and a Mr. Maxwell. They ascended by way of the Eastern Spur, thence to the Chimney, the Monument peaks and the Tableland, and from there to Chimney Pond. The other party, consisting of John C. Houghton and G. L. Vose, made the ascent in September, by the Southwest Slide. Many of the plants collected by these parties are enumerated in the report of the Survey for 1861, while others are specially indicated in the Portland Catalogue, prepared by Prof. Goodale and the late Rev. Joseph Blake. Most of the specimens, stored temporarily in Portland, were destroyed by fire, though a very few are still extant.

In August, 1873, and again in 1874, a party from Orono and Bangor, under the leadership of M. C. Fernald, and with F. Lamson-Scribner as botanist, ascended by the East Spur. The botanical results of these expeditions were published several years later by Prof. Scribner in the Botanical Gazette (xvii. 46–54) and most of the specimens are in the herbarium of the New England Botanical Club.

In August, 1892, another party from the University of Maine at Orono, with the late Fred P. Briggs as botanist, ascended the North wall of the North Basin to the North Summit, thus exploring almost if not quite virgin territory. The results of this trip were enumerated by Mr. Briggs in the Bulletin of the Torrey Botanical Club (xix. 333–336), but unfortunately without special indication of stations.

In 1895, Prof. Alfred B. Aubert of Orono published in Le Diatomiste (ii. 211) a list of Diatoms from Katahdin, collected by Prof. L. H. Merrill.

In September, 1898, another large party from Orono with several

botanists, the late Francis L. Harvey, his son, Le Roy H. Harvey, Elmer D. Merrill, and P. L. Ricker, under the able escort of Capt. Rogers and his sons, entered the Great Basin by way of the modern Wassataquoik trail. It was too late for good botanizing, but a few novelties were found. These were recorded by Mr. Merrill in Rhodora (i. 185, 186), his "Three Ponds" probably being the upper of the three, which for convenience and clearness is here designated as Depot Pond.

The account of the most recent botanical explorations on the mountain is contained in the articles which accompany this. In order to bring to date such information as we now possess concerning the higher plants of Katahdin, all publications known to the writer have been examined and their records carefully noted. In the following list, if no authority for the report is given, the statement is based upon observations made in 1900 by the writer and his companions. A single asterisk (*) before the name indicates that this is the first record (at least in a published list) of the species or variety from Maine, while two asterisks (* *) indicate that the plant has not been previously recorded from New England.

Vascular Plants noted in the Basins (above Depot Pond) and on the Upper Slopes of Katahdin.

Osmunda regalis, L. Margin of Depot Pond. On July 16, the delicate young fronds were 1 or 2 dm. (4 to 8 in.) high.

O. Claytoniana, L. By brook, Southwest wall, North Basin, altitude about 1230 m. (4000 ft.).

Aspidium aculeatum, Swartz, var. *Braunii*, Doell. Rocks in the Great Basin (*Goodale*).

A. spinulosum, Swartz, var. *dilatatum*, Hook. Common in woods; following brooks nearly to the crest.

Phegopteris polypodioides, Fée. Common under spruces.

P. Dryopteris, Fée. Common under spruces.

Pteris aquilina, L. Shelves at 1230 to 1385 m. (4000 to 4500 ft.) North Wall, North Basin.

Lycopodium Selago, L. Very common on shaded cliffs, descending to the shores of Depot Pond.

L. lucidulum, Michx. Common in woods on lower slopes.

L. obscurum, L., var. *dendroideum*, D. C. E. Infrequent in woods, Great Basin.

L. annotinum, L., var. *pungens*, Spring. Katahdin (*Blake*); Eastern Spur (*Scribner*); North Mt. (*Briggs*).

** *L. sitchense*, Rupr. North Mt. (*Briggs*); near head of Saddle Brook and on the eastern edge of the Saddle.

L. clavatum, L. In woods, Great Basin.

** *L. clavatum*, L. var. *monostachyon*, Hook. Fl. ii. 267. North wall, North Basin, at 1230 to 1385 m. (4000 to 4500 ft.).

Isoëtes echinospora, Durieu, var. *Braunii*, Engelm. Depot Pond (*E. D. Merrill*).

Larix americana, Michx. Few depressed wide-spreading trees near the head of the North Basin, alt. about 1140 m. (3700 ft.).

Picea nigra, Link. Abundant on the lower slopes, becoming dwarfed and excessively tangled and depressed on the upper slopes of the Basins.

Abies balsamea, Mill. Common, ascending to the crest.

Thuja occidentalis, L. Depot Pond.

** *Juniperus communis*, L. var. *nana*, Loud.[1] Shelves at 1230 to 1385 m. (4000 to 4500 ft.), North Basin. Collected in flower on the *West* wall, July 13; in nearly mature fruit on the *North* wall. July 14.

Taxus canadensis, Willd. In woods, Great Basin.

Hierochloë alpina, R. & S. Katahdin (*Blake*); "Saddleback," Eastern Spur (*Scribner*); South wall, South Basin; near Monument peaks.

Phleum alpinum, L. North Mt. (*Briggs*).

Cinna pendula. Trin. North Mt. (*Briggs*); West wall, North Basin, alt. 1230 m. (4000 ft.).

Agrostis rubra, L. Common, descending far below Depot Pond (to the McLeod Camp). Named by Prof. Scribner.

* *A. Pickeringii*, Tuck. Common, descending to woods in the Great Basin. Named by Prof. Scribner.

Calamagrostis canadensis, Beauv. By brooks and on slides.

C. Langsdorfii, Trin. Slide at head of North Basin.

Deschampsia flexeosa, Trin. Common.

D. caespitosa, Beauv. Abundant in North Basin (*Briggs*). Doubtful!

[1] According to Mr. Alfred Rehder this name applies to the Arctic and high-alpine plant, while the common low juniper of New England is *J. communis*, var. *canadensis*, Loud.

* *D. atropurpurea*, Scheele. West wall, North Basin, alt. 1230 to 1385 m. (4000 to 4500 ft.); between the East Monument peak and Pomola.

Trisetum subspicatum, Beauv. Slide at head of North Basin.

Avena striata, Michx. Slide at head of North Basin, alt. 1230 m. (4000 ft.); also in woods, Great Basin.

Danthonia spicata, Beauv. Shelves at 1230 to 1385 m. (4000 to 4500 ft.), North wall, North Basin.

Poa laxa, Haenke. Very common and variable.

P. pratensis, L. A few plants introduced at site of old Appalachian hut, near Chimney Pond.

P. nemoralis, L. Chimney Pond.

Glyceria nervata, Trin. Chimney Pond.

* *Festuca rubra*, L. (viviparous form). Slide at head of North Basin. Named by Prof. Scribner.

* *Agropyron violaceum*, Lange. North Mt. (*Briggs*); Slide at head of North Basin. The Maine plant formerly reported under this name is *A. Novae-Angliae*, Scribner.

Scirpus caespitosus, L. Common.

Eriophorum alpinum, L. North Mt. (*Briggs*).

Carex Grahami, Boott. (See Rhodora, iii. 44, 49.) Depot Pond.

** *C. saxatilis*, L. (See Rhodora, iii, 44, 50.) Chimney Pond and Depot Pond. This is doubtless the *C. pulla ?* reported by Scribner from Chimney Pond.

C. scabrata, Schw. Chimney Pond.

C. atrata, L., var. *ovata*, Boott. North Mt. (*Briggs*); West and Southwest walls, North Basin, alt. 1230 to 1385 m. (4000 to 4500 ft.).

C. lenticularis, Michx. Chimney Pond — first noted by Scribner.

C. rigida, Good., var. (?) *Bigelovii*, Tuck. Everywhere above timber-line.

C. torta, Boott. Meadow, head of Chimney Pond.

C. rariflora, Smith. Collected on Katahdin by Prof. G. L. Goodale in 1861, but not since detected.

C. arctata, Boott. Chimney Pond.

* *C. arctata*, Boott, var. *Faxoni*, Bailey. Occasional in the Great Basin, reaching an altitude of 1230 m. (4000 ft.) on the North wall of the North Basin.

C. debilis, Michx., var. *Rudgei*, Bailey. Lower portions of the mountain.

C. flava, L. Wet shelves at 1230 to 1385 m. (4000 to 4500 ft.). West wall, North Basin.

C. flava, L., var. *pumila*, Cosson & Germain (*C. viridula*, Michx.). Depot Pond.

** *C.* (*Oligocarpae*) **katahdinensis.** (Plate 32.) Caespitose: leaves flat, 1 to 2.5 dm. long, 3 or 4 mm. broad, more or less scabrous on the margins, with the similar bracts very much (2 to 6 times) overtopping the slender rough-angled culms: pistillate spikes mostly 3 or 4, all approximate, or the lower remote, short pedicelled, 8 to 14 mm. long, 5- to 10-flowered; scales ovate, scarious, whitish, with green midrib prolonged into a slender smooth or rough awn: perigynia elliptic, 3 or 4 mm. long, mostly exceeding the scales, obscurely resinous-punctate or glossy, 16- to 24-nerved, essentially beakless, with entire orifice: staminate spike short-peduncled or subsessile, 5 to 8 mm. long, generally hidden by the upper pistillate ones; flowers very few; the lower scale bract-like and rough-awned, nearly equalling the spike, the others acuminate. — Gravelly margin of Depot Pond, entrance to the Great Basin of Mt. Katahdin, July 16, 1900 (*E. F. Williams, J. R. Churchill* and *M. L. Fernald*).

A species intermediate in some of its characters between *C. conoidea* and *C. oligocarpa*. Its perigynium in shape, color and nerving is essentially like that of *C. conoidea*. The staminate spike and the elongated bracts are more as in *C. oligocarpa*. In its short culms, very much exceeded by the leaves, and in its approximate spikes it is unlike either of those species. *C. oligocarpa* is unknown east of the Connecticut valley; and although *C. conoidea* — chiefly a coastal species in Maine — follows the Penobscot to Eddington and occurs in the St. John valley, it is a plant of low altitudes and may be quickly distinguished from *C. katahdinensis* by its tall culm, scattered spikes, short bracts, and the longer elevated staminate spike with mostly oblong blunt scales.

C. laxiflora, Lam., var. *varians*, Bailey. Woods in the Great Basin.

C. pedunculata, Muhl. Katahdin (*Blake*).

C. scirpoidea, Michx. Common.

C. deflexa, Hornem. Common both in woods at the base and among rocks on the summit ridge.

C. Novae-Angliae, Schw. Common in the Great Basin.

C. communis, Bailey. Shelves at 1230 to 1385 m. (4000 to 4500 ft.). North wall, North Basin.

C. communis, Bailey, var. *Wheeleri*, Bailey. Abundant in woods above Depot Pond.

C. leptalea, Wahl. (*C. polytrichoides*, Muhl.) Mossy dripping shelves at 1230 to 1385 m. (4000 to4 500 ft.). West wall, North Basin.

C. brunnescens, Poir. (*C. canescens*, L., var. *alpicola*, Wahl.) Very common.

C. trisperma, Dewey. Outlet of Depot Pond.

Juncus filiformis, L. Katahdin (*Goodale, Scribner*); North Mt. (*Briggs*).

J. trifidus, L. Common.

Luzula spadicea, DC., var. *melanocarpa*, Meyer. Common.

L. arcuata, Meyer. Katahdin (*Goodale*); common from the head of the Tableland to Pomola.

L. spicata, Desv. Common.

Smilacina racemosa, Desf. On shelves at 1230 to 1385 m. (4000 to 4500 ft.), North wall, North Basin.

Maianthemum canadense, Desf. Common, ascending to the heads of brooks.

Streptopus amplexifolius, DC. Woods, Great Basin.

S. roseus, Michx. Common, ascending to the heads of brooks.

Trillium undulatum, Willd. (*T. erythrocarpum*, Michx.). Common at low levels; ascending to 1230 m. (4000 ft.) in North Basin.

Iris versicolor, L. Depot Pond.

Habenaria dilatata, Hook. North Mt. (*Briggs*); wet shelves at 1230 to 1385 m. (4000 to 4500 ft.), West wall, North Basin.

Listera convallarioides, Torr. Katahdin (*J. W. Chickering* in Gray Herb.).

L. cordata, R. Br. Scattered but frequent.

Goodyera tesselata, Lodd. Woods, Great Basin.

Populus tremuloides, Michx. Dwarf trees a few feet high, near Chimney Pond.

Salix rostrata, Richardson. By small pool, below Chimney Pond.

S. argyrocarpa, Anders. Common, Eastern Spur (*Scribner*).

* *S. phylicifolia*, L. Meadow at entrance to Great Basin; small pool, below Chimney Pond; head of Saddle Brook. A pubescent

willow, possibly referable here, was collected in the North Basin, but further study is necessary before its identity can be satisfactorily made out.

S. balsamifera, Barratt. By small pool, below Chimney Pond.

S. Uva-ursi, Pursh. Very common on more exposed slopes and tablelands.

S. herbacea, L. Katahdin (*Goodale*); in moss, head of Eastern Slide and on the "Saddleback," Eastern Spur (*Scribner*); in moss, head of Saddle Brook.

Corylus rostrata, Ait. Depot Pond.

** *Betula papyrifera*, Marsh., var. *cordifolia*, Regel. The common form of the Canoe Birch in the Great Basin, extending as a dwarf shrub to the crests and to the North summits. One of Regel's type specimens was collected on Katahdin in 1847 by Aaron Young.

B. odorata, Bechst., var. *tortuosa*, Regel. (*B. papyracea*, var. *minor*, Tuck., as to his own specimens in Herb. Gray). Summit of North Mt. This shrub, which also occurs on Washington, quite lacks the pubescence of *B. papyrifera*. It is identical with the dwarf form of the Scandinavian and Siberian *B. odorata*, and is well represented in Fl. Dan. xvii. t. 2818.

B. glandulosa, Michx. At various stations above timber-line. Most of the Katahdin material is var. *rotundifolia*, Regel.

Alnus viridis, DC. Common on lower slopes, following brooks to the crest.

Comandra livida, Richards. Abundant on the floor and the South wall of the North Basin; rare on North wall, South Basin.

Rumex Acetosella, L. Few plants introduced at site of old Appalachian hut, near Chimney Pond.

Polygonum viviparum, L. "Long Crooked Slide," South wall, South Basin (*Scribner*); notch between the Chimney and Pomola.

Arenaria groenlandica, Spreng. Common.

Stellaria borealis, Bigelow. By rivulet at 1385 m. (4500 ft.), South Basin (*E. D. Merrill*).

Thalictrum polygamum, Muhl. Depot Pond. Flowering specimens 2.5 dm. (10 in.) high.

Ranunculus Flammula, L., var. *reptans*, E. Meyer. Depot Pond.

R. acris, L. Few plants introduced at site of old Appalachian hut, near Chimney Pond.

Coptis trifolia, Salisb. Common.

Actaea spicata, L., var. *rubra*, Ait. Frequent in Great Basin, ascending nearly to the head of Saddle Brook.

Cardamine bellidifolia, L. "Long Crooked Slide," South Basin (*Scribner*); beach at head of Chimney Pond; shaded rocks from the Monument peaks to Pomola; West wall, North Basin.

Drosera rotundifolia, L. Wet shelves, at 1230 to 1385 m. (4000 to 4500 ft.); North and West walls, North Basin.

Saxifraga stellaris, L., var. *comosa*, Willd. Near the chimney — first detected in 1856 by Joseph Blake; north of the West Monument peak — first detected by Scribner.

Ribes lacustre, Poir. Common, ascending to the heads of streams.

R. prostratum, L'Hér. Common, with the last.

R. rubrum, L., var. *subglandulosum*, Maxim. Great Basin (*Goodale*); near head of Saddle Brook.

Prunus pennsylvanica, L. f. Shelves at 1230 to 1385 m. (4000 to 4500 ft.); North and West walls, North Basin.

P. Virginiana, L. With the latter.

Spiraea salicifolia, L. var. *latifolia*, Ait. With the last two.

Rubus idaeus, L., var. *strigosus*, Maxim. Common in woods, Great Basin.

R. canadensis, L. (*R. Millspaughii*, Britton). Depot Pond.

Fragaria virginiana, Mill. Shelves at 1230 to 1385 m. (4000 to 4500 ft.); West wall, North Basin.

Potentilla fruticosa, L. North Mt. (*Briggs*); on shelves with the latter species.

P. tridentata, Ait. Common.

Pyrus americana, DC. Frequent below the crest. Some of the young material may be *P. stitchensis*, Piper, Mazama ii. 107 (*P. sambucifolia* of Eastern authors, not Cham. & Schl.).

Amelanchier oligocarpa, Roem. Common, ascending nearly to the crest.

Empetrum nigrum, L. Common; fruit nearly ripe, July 13, on floor of North Basin.

Nemopanthus fascicularis, Raf. Common, ascending nearly to the crest.

Acer spicatum, Lam. Common, ascending nearly to the crest.

A. rubrum, L. Infrequent, Great Basin.

Oxalis Acetosella, L. Common.

Viola Selkirkii, Pursh. Woods in Great Basin ; shelves at 1230 to 1385 m. (4000 to 4500 ft.), North wall, North Basin.

V. palustris, L. Common by streams on the upper slopes ; Chimney Pond. Flowers white.

V. blanda, Willd. Common in Great Basin.

* *V. canina*, L., var. ? Chimney Pond; shelves at 1230 to 1385 m. (4000 to 4500 ft.), North and West walls, North Basin. This plant, identical with that of alpine regions of the White Mts., occurs also in Labrador and Greenland. It differs from *V. canina*, var. *Muhlenbergii*, Gray (*V. labradorica*, Schrank) in its deep blue, not lavender, corolla, entire or subentire stipules, and more rounded upper leaves. Further study of the northern forms is necessary before its status and name can be exactly determined.

Epilobium angustifolium, L. Chimney Pond.

E. Hornemanni, Reich. Scattered, but generally distributed.

** *E. anagallidifolium*, Lam. Immature plants, probably of this high-northern species, were collected in moss near the heads of Saddle Brook and of Saddle Slide.

Heracleum lanatum, Michx. North Mt. (Briggs) ; Shelves at 1230 to 1385 m. (4000 to 4500 ft.), West wall, North Basin; Chimney Pond.

Cornus canadensis, L. Common.

C. stolonifera, Michx. Chimney Pond; floor of North Basin.

Pyrola minor, L. Katahdin (*Blake*); by brooks, Great Basin, ascending nearly to head of Saddle Brook.

Pyrola secunda, L. Under spruces, South wall, North Basin.

Moneses grandiflora, Salisb. Frequent in woods.

Chimaphila umbellata, Nutt. Katahdin (*Goodale*).

Monotropa Hypopitys, L. Katahdin (*Goodale*).

Ledum groenlandicum, Oeder. Common.

Rhododendron Rhodora, Don. Near the Pond, North Basin.

R. lapponicum, Wahl. Very common in more exposed places.

Loiseleuria procumbens, Desv. Katahdin (*Blake*); north of Monument peaks (*Scribner*) ; head of Saddle Brook ; floor of North Basin.

Kalmia augustifolia, L. Frequent.

K. glauca, Ait. Common.

Bryanthus taxifolius, Gray. Above timber-line, East slope of Saddle ; from head of Tableland to Pomola ; upper slopes of North Mt.

Cassiope hypnoides, Don. Eastern edges of North Tableland (*Scribner*); North Mt. (*Briggs*); East slope of Saddle, above timber-line; from the Monument peaks to Pomola.

Andromeda polifolia, L. Wet mossy shelf, at about 1290 m. (4200 ft.), West wall, North Basin. Shrubs 0.5 to 1 dm. (2 to 4 in.) high.

Cassandra calyculata, Don. Depot Pond.

Arctostaphylos alpina, Spreng. Common and fruiting abundantly on the more exposed slopes and tablelands.

Vaccinium pennsylvanicum, Lam., var. *angustifolium*, Gray. North Tablelands (*Scribner*); floor of North Basin.

V. canadense, Kalm. Common on lower slopes; ascending to 1385 m. (4500 ft.) in the North Basin.

V. uliginosum, L. Very common. Fruit beginning to ripen, July 13, on the floor of the North Basin.

V. caespitosum, Michx. Generally distributed on the upper slopes, but less common than the last.

V. Vitis-Idaea, L. Common, even at the summits.

V. Oxycoccus, L. Boggy outlet of Chimney Pond.

Chiogenes serpyllifolia, Salisb. Common on lower slopes.

Diapensia lapponica, L. Abundant on more exposed slopes and tablelands.

Trientalis americana, Pursh. Common in Great Basin; following far up the streams.

Apocynum androsaemifolium, L. Depot Pond.

* *Veronica alpina*, L. By brook, head of Chimney Pond.

Castilleja pallida, Kunth, var. *septentrionalis*, Gray. North Mt. (*Briggs*); shelves at 1230 to 1385 m. (4000 to 4500 ft.), walls of North Basin.

* *Euphrasia Oakesii*, Wettst. With the latter.

Melampyrum lineare, Lam. Floor of North Basin.

* *Galium kamtschaticum*, Steller. Brook-beds, North and West walls, North Basin.

G. triflorum, Michx. Chimney Pond.

Sambucus racemosa, L. Common by streams.

Viburnum pauciflorum, Pylaie. Abundant by streams; ascending nearly to the crest.

V. cassinoides, L. Common on lower slopes; ascending in North Basin to 1385 m. (4500 ft.).

Linnaea borealis, L. Walls of North Basin.

Lonicera caerulea, L. Shelves at 1230 to 1385 m. (4000 to 4500 ft.), West wall, North Basin.

Diervilla trifida, Moench. With the last; also on the North wall, North Basin.

Campanula rotundifolia, L. Common.

Solidago macrophylla, Pursh. Common.

S. Virgaurea, L., var. *alpina*, Bigelow. Common. There were very diverse forms immature in July. These need careful collecting.

Aster Radula, Ait. North Mt. (*Briggs*); common on the walls of the North Basin to 1385 m. (4500 ft.); Chimney Pond.

A. umbellatus, Mill. North and West walls, North Basin, at 1230 to 1385 m. (4000 to 4500 ft.).

A. acuminatus, Michx. With the last.

Gnaphalium supinum, Villars. Rocks in the Great Basin (*Scribner*); North Mt. (*Briggs*); gravelly bank, head of Saddle Brook.

Arnica Chamissonis, Less. Katahdin, rare (*Goodale*); foot of Eastern Slide (*Scribner*); North Mt. (*Briggs*); shelves at 1230 to 1385 m. (4000 to 4500 ft.), North and West walls, North Basin.

Senecio Balsamitae, Muhl. Depot Pond — first noted by E. D. Merrill.

Prenanthes trifoliolata, Fernald, var. **nana**, n. comb. (*P. alba*, var. *nana*, Bigelow. *P. serpentaria*, var. *nana*, Gray. *Nabalus nanus*, DC.) Common.

P. Boottii, Gray. Higher slopes; mostly on the crest.

Explanation of Plate 32. — *Carex katahdinensis*: Fig. 1, portion of plant; fig. 2, scale from staminate spike; fig. 3, scale from pistillate spike; fig. 4, perigynium and scale. *C. conoidea*: Fig. 5, mature inflorescence; fig. 6, scale from staminate spike; fig. 7, perigynium and scale. *C. oligocarpa*: Fig. 8, mature inflorescence: fig. 9, scale from staminate spike; fig. 10, perigynium and scale.

BRYOPHYTES OF MOUNT KATAHDIN.

G. G. Kennedy and J. F. Collins.

The following preliminary list of the Musci and Hepaticae of Mount Katahdin is based on collections made from July 7–16, 1900. The Hepaticae were determined by Dr. A. W. Evans; the Dicrana by Dr. R. H. True, and the remainder by Dr. G. G. Kennedy, Messrs. J. F. Collins and E. B. Chamberlain.

Not all of the specimens collected have as yet been critically examined, but it is thought best to publish the list with the other papers on the mountain in the present number of Rhodora, and leave for further study the undetermined specimens. The introductory sketch by Dr. Kennedy and the list of species are followed by Mr. Collins' notes on some of the rarer mosses.

Introductory Sketch.

Our path up Mt. Katahdin, after leaving McLeod's camp, soon entered virgin forest where the shade of trees and green carpet of mosses refreshed the eyes weary with gazing on the burnt and fallen timber and rocky wastes of the Wassataquoik valley.

The rain came down with less pelting violence, and as I entered an area of large white cedars (Arbor-vitae) I found myself thinking of Richard Spruce and his wanderings in the Amazon valley with its tropical rains. Surely he could not have seen a more abundant moss garden than surrounded us, and we instinctively stopped to gather, or at least inspect, the mosses into which our feet had plunged. But our search was not rewarded by a multiplicity of species. It was all *Hypnum Schreberi*, Willd., *H. Crista-castrensis*, L. and *Hylocomium splendens* (Hedw.) Bry. Eur., with an occasional *Dicranum* on a projecting rock; and during the remainder of our walk to camp we saw practically nothing else. Perhaps the rain veiled our eyes, perhaps our footsteps needed constant attention, but those few mosses and none others were always in evidence. The *Hylocomium splendens* grows only in the woods, but the *Hypnum Schreberi* and *H. Crista-castrensis* are found to the very summit of the mountain, often in masses and often sparingly mixed with Pogonatums and other mosses.

If these *Hypna* were abundant we were equally surprised at the scarcity of tree mosses; in the evening on comparing notes we found that neither of us had observed a moss on a tree, and in our whole stay at camp we found none. At what altitude the Neckera, Leucodon and Orthotrichums vanish we cannot say, but our list shows none collected on the slopes of Katahdin. In the woods for a few miles after leaving the East Branch grow *Neckera pennata*, Hedw., *Leucodon sciuroides*, Schwaeg. and various Orthotrichums in as much luxuriance as in other northern forests, but we saw none on the mountain. It is probable that though infrequent they are not wholly wanting, for I found on one of the logs of our cabin a little

bunch of moss consisting of *Ulota crispa*, (L.) Brid., *Ulota crispula*, Bruch. and *Ulota Ludwigii*, (Brid.) Brid, and if these common forest species are there, the others may be confidently expected.

The Alpine region of Katahdin was very inadequately explored by us: its large area of tableland, and its many precipitous slopes and ledges would take more than one summer to investigate, and we may look for interesting discoveries in the future. The Tableland is an Alpine garden much larger than at Mt. Washington and of the same granitic rock formation; the dome of Mt. Washington is probably drier and the rainfall there has a less evident influence on vegetation from sinking deeper in among the rocky boulders and running off sooner from the want of soil to retain it. Mt. Washington has passed the era of slides and falls of masses of rock, while Katahdin is yet subject to both these changes, and is therefore in a transition state as regards the permanence of its present flora or the advent of new species. In fact, to compare small things with great, the change in the moss flora at Blue Hill in the Metropolitan Park Reservation near Boston, as shown in the steep sides of certain new avenues laid out a few years ago and now covered with *Pogonatum tenue*, Michx., *Leptotrichum pallidum*, Hampe and *Dicranella heteromalla*, Schimp. shows that earth slides soon make a resting place for the spores of mosses, where a very wet or a very dry season may make great changes in the abundance of the plants.

As compared with Mt. Mansfield, Katahdin lacks that slightly calcareous soil which gives a special character to the Green Mountain vegetation, and is shown in mosses by the presence of Gymnostomums, Barbulas, and Physcomitriums which with *Blindia*, *Seligeria*, and *Distichium* always seem to me to be planted in just a little limy dust. It is doubtful if these species will ever be found on Katahdin. It is probable that the summits of Mansfield, 4396 feet high, and Katahdin, 5215 feet high, have a larger rainfall than Washington, 6300 feet high; at least the experience of our party of botanists who have explored all three of the mountains would lead us to that conclusion.

List of Bryophytes collected in the Basins and on the Upper Slopes of Katahdin.

A single asterisk (*) indicates species or varieties hitherto unrecorded from Maine, and double asterisks (* *) indicate those hitherto unrecorded from New England.

Musci.

* *Amblystegium varium* (Hedw.) Lindeb.
Andreaea petrophila Ehrh.
Aulacomnium palustre (L.) Schwgr. (a var. or form)
* *Bryum pallescens* Schleich.
Bryum pseudo-triquetrum (Hedw.) Schwaegr.
Catharinea angustata Brid.
** " *sp*
Ceratodon purpureus (L.) Brid.
* *Conostomum boreale* Swz.
** *Cynodontium polycarpum strumiferum* (W. et M.) Schpr.
Dicranella heteromalla (L.) Schpr.
* *Dicranoweisia crispula* (Hedw.) Lindb.
Dicranum Bonjeani De Not.
" *congestum* Brid.
** " *congestum flexicaule* Br. Eur.
Dicranum elongatum Schwaegr.
* " *fulvellum* (Dicks.) Sm.
" *fuscescens* Turn.
* " *fuscescens Eatoni* R. et C.
Dicranum longifolium Ehrh.
" *undulatum* Ehrh.
Fissidens osmundoides (Swz.) Hedw.
* *Grimmia Doniana* Sm.
Hylocomium splendens (Hedw.) Br. Eur.
Hylocomium umbratum (Ehrh.) Br. Eur.
Hypnum Crista-castrensis L.
" *imponens* Hedw.
* " *montanum* Wils. mss.
" *Schreberi* Willd.
" *uncinatum* Hedw.
Leucobryum glaucum (L.) Schpr.
* *Mielichhoferia nitida elongata* (Hsch.) Br. Eur.
Mnium affine Bland. (a variety).
" *punctatum* (L.) Hedw.
" *spinulosum* Br. Eur.
Pogonatum alpinum (L.) Roehl.
Pogonatum capillare (Rich.) Brid.
* *Pogonatum urnigerum* (L.) Beau.
Polytrichum commune L.
" *juniperinum* Willd.
" *Ohioense* R. et C.
" *piliferum* Schreb.
" *strictum* Banks.
Pylaisia polyantha (Schreb.) Br. Eur.
Racomitrium aciculare (L.) Brid.
Racomitrium fasciculare (Schrad.) Brid.
Racomitrium lanuginosum (Hedw.) Brid.
Racomitrium sudeticum (Funck) Br. Eur.
Sphagnum acutifolium Ehrh.
" *papillosum* Lindb.
" *rigidum* (Nees) Schpr.
" *squarrosum* Pers.
* *Tayloria tenuis* (Dicks.) Schpr.
Tetraphis pellucida (L.) Hedw.
* *Tetraplodon angustatus* (L. fil.) Br. Eur.
** *Tetrodontium Brownianum rigidum* (Funck) Jur.
Ulota crispa (L.) Brid.
" *crispula* Bruch.
" *Ludwigii* (Brid.) Brid.
** *Webera elongata macrocarpa* (Hsch.) Schpr.
Webera nutans Hedw.

HEPATICAE.

Bazzania trilobata (L.) S. F. Gray.
Blepharostoma setiforme (Ehrh.) Lindb.
Blepharostoma trichophyllum (L.) Dum.
Diplophylleia taxifolia (Wahl.) Trev.
* *Gymnomitrium concinnatum* (Lt.) Corda.
* *Lophozia* alpestris (Schleich.) Evans, N. Comb. (*Jungermannia alpestris* Schleich.)
" *attenuata* (Lindb.) Dum.
**Lophozia barbata* (Schreb.) Dum.
" *incisa* (Schrad.) Dum.
" *inflata* (Hud.) M A. Howe.
* * " *lycopodioides* (Wallr.) Schif.
" *ventricosa* (Dicks.) Dum.
Marsupella emarginata (Ehrh.) Dum.
* *Nardia obovata* (Nees) Lindb.
Ptilidium ciliare (L.) Nees.
* *Scapania umbrosa* (Schrad.) Dum.
" *undulata* (L.) Dum.

NOTES ON THE BRYOPHYTES OF MAINE,— II.

KATAHDIN MOSSES.

J. FRANKLIN COLLINS.

Amblystegium varium (Hedw.) Lindb. Widely distributed in North America, ranging from Newfoundland and New Brunswick to British Columbia and southward, though it seems to have been definitely reported from only four of the New England States, — Vermont, Massachusetts, Rhode Island and Connecticut. It also occurs in Europe, Asia and South America.

Catharinea. A few specimens of a *Catharinea* without fruit. In some of their characteristics these plants agree with Macoun's specimens of *Atrichum leiophyllum* Kindb. distributed in his Canadian Musci, and it seems best to refer them, provisionally, to this species until an opportunity occurs for further and more critical study. They are, with but little doubt, allied to *A. leiophyllum.* No record has been found of any New England *Catharinea* with undifferentiated leaf margins.

Conostomum boreale Swz. has been reported from Newfoundland, Gaspé, White, Adirondack and Rocky Mts., British Columbia and northward. On Katahdin this moss occurs, so far as these collections are concerned, from 4,000 feet upward — mostly above the Tableland.

Cynodontium polycarpum strumiferum (W. et M.) Schpr., occurs from Newfoundland and Labrador to British Columbia and high northward, but seems to have been reported thus far from only one of the States (Minnesota). The leaves of the Katahdin material are not sheathing at base and are papillose toward the apex. The margins are narrowly revolute and unistratose except at apex, where they are bistratose but not revolute. The dry capsule is arcuate, distinctly furrowed and strumose.

Dicranoweisia crispula (Hedw.) Lindb. About the ponds in the North and South Basins. Reported from Greenland, Labrador, Gaspé, Rocky and Selkirk Mts., Oregon, Washington, Utah, California, Idaho, etc. In 1846 Mr. S. T. Olney reported this moss ("Weissia crispula Hedw.") as occurring on rocks in Providence, R. I., but no specimens are preserved in the Olney Herbarium at Brown University. In 1888 Mr. Bennett omitted the moss from his catalogue. His reason for doing so is not known to the writer.

Dicranum congestum flexicaule Br. Eur. Apparently not reported from any definite station, yet recorded as occurring with the type (i. e. *D. fuscescens* Turn.).

Dicranum fulvellum (Dicks.) Sm. This species occurs in Europe. In North America it has been reported from Greenland, Oregon, New York and the White Mts. All the Katahdin material was collected on the main peak above the Tableland.

Dicranum fuscescens Eatoni R. et C. The writer has seen no fruit on these specimens, the stems of which reach a height of nearly 15 cm. Dr. True writes that he has this variety from Montana and New Hampshire.

Grimmia Doniana Sm. There seems to be very little doubt that a species of *Grimmia* collected near the summit and again at the Chimney should be referred to this species, although critical comparison with authentic specimens from other localities has not been made. Previously recorded from White Mts., Alberta and Western North America.

Hypnum montanum Wils. mss. Heretofore reported from Newfoundland, Ontario and White Mts. The leaves differ but slightly from those figured in Sullivant's Icones, tab. 113.

Mielichhoferia nitida elongata (Hsch.) Br. Eur. These luxuriant sterile specimens (collected by Dr. Kennedy) were growing in a very wet depression on the sheltered side of a boulder near the summit.

The stems, in some cases fully 18 cm. long, were somewhat reclining and the green tips ascending. Except for this difference of habit the general appearance of the mass of plants is well represented in Bry. Eur. tab. 329. The leaves, however, differ from the illustrations there given in being narrower, with a decidedly stronger costa and a slightly sharper apex. This variation may be caused by its exceedingly moist habitat. Dr. Kennedy has compared the Katahdin specimens with Husnot's Mus. Gall. No. 331, and with Austin's Musci Appal. Suppl. I, No. 509, where it is given as *M. compacta* (*Bryum compactum*, Bot. Gaz. 2 : 111). Habitat, alpine regions of the White Mts., common; also mountains of New York and New Jersey.

Pogonatum urnigerum (L.) Beauv. Widely distributed in Europe, Asia, Africa and North America. It has been reported from Newfoundland, Nova Scotia, New Brunswick, Quebec, New Hampshire, Vermont, Massachusetts, and numerous other localities throughout North America.

Tayloria tenuis (Dicks.) Schpr. On bones and hair of caribou at the edge of the Tableland (G. G. K.). Young and without fruit, yet the leaves are characteristic of the genus, and after a careful comparison with specimens from Quebec, Vermont and Alaska, it seems safer to place the Katahdin plant here, rather than as a form of *T. serrata* (Hedw.) Br. Eur., with smaller, less serrate leaves. It corresponds very closely with Macoun's Can. Mus. 141, in areolation, size and shape of leaf, but differs in having a more attenuate apex and less strongly serrate margin in the upper part. Leaf drawings of the Katahdin specimens made with a camera correspond very accurately in all details with the illustrations of var. *tenuis* in the Bry. Eur. (tab. 285), except that the serratures are only about half as prominent as there figured (fig. 6, a.). *T. tenuis* is reported from New Brunswick, Nova Scotia, Gaspé, Greenland, Montana and Vermont. At least a portion of the *Tayloria* from Mt. Mansfield (collected by Dr. Kennedy) appears to be *T. serrata*.

Tetraplodon angustatus (L. fil.) Br. Eur. On nearly extinct remains of some unidentified animal. Previously reported in New England from the White Mts. It occurs in Newfoundland, New Brunswick (close to the Maine border), the Adirondacks, Lake Superior, Manitoba, British Columbia and northward; also in Europe. The leaves of this material vary slightly from some of the

published descriptions of the species in having the costa often dissolving below the sulula and the teeth of the upper margins long, slender and prominent. Occasionally a single tooth reaches a length of .3 mm. or more. The lower leaves are about $2 \times \frac{3}{4}$ mm., the longer ones of the stem 4×1 mm., and the perichaetial $2 \times \frac{3}{4}$ mm. These measurements do not include the subula, which on the lower leaves is about $\frac{3}{4}$ mm. long, becoming gradually longer on the succeeding leaves until on the inner perichaetial it reaches a length of about 3 mm., and exceeds the lamina. Tab. LXII. B. fig. 1a. of Braithwaite's British Moss-flora would correctly represent the apex of these leaves if the costa dissolved about twice as far from the extreme apex as there figured. The only noticeable difference between the leaves of the Katahdin plants and authentic Scandinavian specimens is that the marginal teeth are usually somewhat longer in the former than in the latter. Unfortunately only a few imperfect capsules were obtained.

Tetrodontium Brownianum rigidum (Funck) Jur. (*Tetraphis ovata* Funck). Apparently not hitherto reported from North America. This appears to be identical with H. C. Funck's specimens distributed in his "Cryptogamische Gewächse des Fichtelgebirges" with which the Katahdin specimens have been compared at the Harvard Cryptogamic Herbarium. Limpricht (Die Laubmoose) regards this genus as composed of one species (*Brownianum*) and two varieties (*repandum* and *rigidum*). The species in its typical form, with the long frondiform basal leaves, has apparently not been reported from this country. The var. *repandum* (*T. repandum* Schwaegr.) has been recorded from the White Mt. region and Newfoundland, yet the writer has been unable to detect, with a strong hand lens, any of the characteristic flagelliform basal shoots on the New Hampshire specimens in the James Herbarium. It is quite possible that at least a portion of the White Mt. material may lack these shoots which form practically the only definite means of separating var. *repandum* from var. *rigidum*. Dr. Grout's *Tetrodontium*, from Mt. Prospect, N. H., is apparently identical with the Katahdin plant; both have the very short frondiform leaves, and both are without basal flagellae. Intergrading forms are reported from Europe which connect the species with its var. *rigidum*, and it would perhaps be better (following many authors) to treat the latter as a *form* rather than as a *variety*.

Cardamine bellidifolia in Cumberland County, Maine. — On Sept. 10, 1900, I found this rare alpine species by a stream in West Baldwin, only a few miles northwest of Portland. The plant was growing in crevices of granite rock by a stream in a deep gorge. This stream descends from the highest hills of the region, Saddleback Hills, which are wooded to the top and have an altitude of only 1190 feet. The point at which the *Cardamine* was found was near the base of these hills, perhaps at an altitude of 500 feet. Lest there should be some mistake about the identity of the plant, it was sent to the Gray Herbarium, and there pronounced *C. bellidifolia*. It is surprising to find this plant, otherwise known south of Labrador only in the alpine regions of Katahdin and Washington, in a low section like West Baldwin, for there the country is ordinarily very dry and the soil light and sandy, while the region is much more characterized by southern species — *Galium circaezans*, *Gerardia quercifolia*, *Adiantum pedatum*, *Desmodium paniculatum*, *Helianthus divaricatus*, and *Lespedeza frutescens* — than by northern plants. — Kate Furbish, Brunswick, Maine.

ADDITIONS TO THE FLORA OF WORCESTER COUNTY, MASSACHUSETTS, — III.

Roland M. Harper.

As I only spent two or three weeks in Massachusetts in 1900, I was not able to find many more additions to the flora of Worcester County. But a few plants, which I collected in 1899, have since been identified as species not previously known from the county, and these with a few which I collected last May and June make up the following list.

Panicum macrocarpon, Le Conte. Collected in rich, shady woods, Southbridge, June 24, 1899.

Eleocharis palustris, var. *glaucescens*, Gray. Moist meadow, Southbridge, June 24, 1899.

Scirpus rubrotinctus, Fernald. One specimen collected beside a small brook, Hardwick, July 2, 1899. Identified by Mr. Fernald. It may of interest to note here that I collected this species the following day in Fitzwilliam, N. H., at one of the localities cited in the original description (Rhodora, 2: 20, 21. 1900).

Antennaria Canadensis, var. *Randii*, Fernald. Dry roadside, Southbridge, May 25, 1900. Pistillate only. This variety seems to be more common in southern Worcester County than the type. Previously reported only from Maine and Vermont; but Mr. Fernald tells me that he now refers to this variety some specimens collected in Lexington, Mass.

Antennaria fallax, Greene. Dry roadsides, not common. Southbridge, May 29, 1900; Charlton, May 30.

Antennaria neodioica, var. *attenuata*, Fernald. Dry roadsides, often with the type, Southbridge, May 29, 1900. Not previously reported from Massachusetts.

Antennaria petaloidea, Fernald. Dry roadsides, Southbridge, May 30, 1900. Only a few specimens found, all pistillate. This species has been known hitherto only from Maine, New Hampshire and Vermont.

Two plants of my 1899 list (Rhodora, **1**: 202), on which I made further observations last year, might be mentioned here.

On June 4 I collected *Carex torta* again at the place where I found it in 1899 (in Southbridge), and traced it from the artificial canal to the banks of the Quinebaug River near the upper end of the canal, where it was much more abundant, thus confirming my former supposition in regard to the origin of my first specimen.

On June 12, the day I left Massachusetts, I made a short visit to my locality for *Orontium aquaticum*, in Dudley, and although only one specimen was observed, I was surprised to find that it bore no less than eleven spadices in various stages of flower and fruit. So this species seems to be in no immediate danger of disappearing from this locality.

Two other plants, which had previously been reported each from a single town in the county, were collected last year at new stations. *Woodsia Ilvensis*, R. Br. (reported only from Spencer), I found in Charlton, May 30; and *Selaginella rupestris*, Spring (reported from Worcester), I found in Sturbridge, June 6.

Columbia University.

A LIST OF PLANTS SEEN ON THE ISLAND OF MONHEGAN, MAINE, JUNE 20–25, 1900.

MABEL PRISCILLA COOK.

THE following list of plants on the island of Monhegan, Maine, compiled from the results of the botanizing done during so short a visit to the island, and necessarily limited to the plants of that particular season, is in no way to be considered a Flora of Monhegan. There are very few plants included in the list which were not found in bloom. I feel, however, that the territory was very well gone over as I had the advantage of the guidance of an old and enthusiastic visitor to Monhegan. The sixteen miles of ocean between the island and the "main" led me to hope that I might find some especially interesting features, in the local flora, so that it was a surprise to find what a large number of introduced species were present. The absence of salt marshes and of any true beaches eliminates a large number of those plants that we expect to find in any list from a seashore station. A very potent agent in the distribution of plants over the whole area of the island has been the presence of large flocks of sheep, in whose fleeces the seeds of many distinctly introduced species have been carried to the most remote parts of the island.

It will be interesting to see what effects the severe fire that devastated the eastern end of the island during the late summer and fall of 1900 will have upon the flora. A peat-bog in the center of the island burned, underground, for weeks, and a large tract of woods was destroyed.

In the following list asterisks have been employed to distinguish introduced species, and the sign † indicates plants common upon the island. The nomenclature followed is, as far as possible, that of the Synoptical Flora. I am indebted to Mr. M. L. Fernald for the determination of the Carices.

† *Thalictrum polygamum*, Muhl.
† * *Ranunculus repens*, L.
* *R. bulbosus*, L.
† * *R. acris*, L.
† *Coptis trifolia*, *Salisb.*
* *Aquilegia vulgaris*, L.
† * *Sisymbrium officinale*, Scop.
† * *Capsella Bursa-pastoris*, Moench.
† *Helianthemum majus*, B. S. P.
† *Lechea intermedia*, Leggett.

† *Viola palmata*, L., var. *cucullata*, Gray.
V. blanda, Willd.
† *V. lanceolata*, L.
† *Arenaria lateriflora*, L.
† * *Cerastium vulgatum*, L.
† *C. arvense*, L.
† *Sagina procumbens*, L.
† *Spergularia rubra*, *Presl.*
† * *Hypericum perforatum*, L.
† *H. Canadense*, L.
† *H. Virginicum*, L.
† * *Malva rotundifolia*, L.
Geranium Robertianum, L.
† *Oxalis cymosa*, Small.
† *Impatiens biflora*, Walt.
† *Ilex verticillata*, Gray, var. *tenuifolia*, Watson.
Acer spicatum, L.
† *A. rubrum*, L.
Rhus copallina, L.
† *R. Toxicodendron*, L.
† * *Trifolium pratense*, L.
† * *T. repens*, L.
† * *Vicia Cracca*, L.
Lathyrus maritimus, Big. (one station, on rocks).
Prunus serotina, Ehrh.
† *Spiraea salicifolia*, L.
† *Rubus triflorus*, Richardson.
† *R. idaeus*, L., var. *strigosus*, Maxim.
† *R. argutus*, Link.
† *R. villosus*, Ait. (*R. Canadensis* of authors).
† *Fragaria Virginiana*, Miller (everywhere, since the sheep have been taken off the island).
† *Potentilla argentea*, L.
† *P. littoralis*, Rydb.
† *P. tridentata*, Ait.
† *P. Anserina*, L.
† *P. simplex*, Michx.
† *Rosa Carolina*, L.
† *R. lucida*, Ehrh.
† *Pyrus arbutifolia*, L., var. *melanocarpa*, Hook. f.
Amelanchier Canadensis, T. & G.
† *Ribes oxyacanthoides*, L.
† *R. prostratum*, L'Her.
† *Drosera rotundifolia*, L.
† *D. intermedia*, Hayne, var. *Americana*, DC.
Epilobium angustifolium, L. (plentiful in one station).
E. coloratum, Muhl. (seen in one station on rocks).
Oenothera pumila, L.
Coelopleurum actaeifolium, Coult. & Rose (*C. Gmelini* of authors, not Ledeb.).
* *Heracleum lanatum*, Mx. (one station seen).
† * *Carum Carui*, L.
† *Cicuta maculata*, L.
† *Hydrocotyle Americana*, L.
† *Aralia nudicaulis*, L.
A. hispida, Vent.
† *Cornus Canadensis*, L.
Sambucus Canadensis, L.
† *Linnaea borealis*, Gronovius.
Houstonia caerulea, L.
Galium trifidum, L.
Galium triflorum, Michx.
† *Eupatorium perfoliatum*, L.
Solidago sempervirens, L.
S. nemoralis, L.

† *Aster cordifolius*, L.
Erigeron strigosus, Muhl.
Antennaria Parlinii, Fernald.
A. neodioica, Greene.
† *Ambrosia artemisiaefolia*, L.
† * *Anthemis Cotula*, DC.
* *Achillea Millefolium*, L.
† * *Chrysanthemum Leucanthemum*, L.
† * *Arctium minus*, Bernh.
† * *Cnicus lanceolatus*, Hoffm.
† * *C. arvensis*, Hoffm.
* *Leontodon autumnalis*, L.
* *Hieracium aurantiacum*, L.
† *Prenanthes trifoliolata*, Fernald.
† *P. altissima*, L.
† * *Taraxacum officinale*, Weber.
† * *T. erythrospermum*, Andrz. (everywhere more common than *T. officinale*).
† *Vaccinium Pennsylvanicum*, Lam.
† *V. Oxycoccus*, L.
Rhododendron Rhodora, Don.
Moneses grandiflora, Salisb.
† *Lysimachia stricta*, Ait.
† * *Anagallis arvensis*, L.
Gentiana crinita, Froel. (not seen, but reported by reliable authority).
† *Menyanthes trifoliata*, L.
† *Convolvulus Sepium*, L.
† * *Verbascum Thapsus*, L.
† *Rhinanthus Crista-galli*, L.
† *Lycopus sinuatus*, Ell.
† *Prunella vulgaris*, L.
† *Plantago major*, L., var. *minima*, Decaisne. (very common; see note in Proc. Portland Soc. Nat. Hist. II, 85, on the unusual downiness).
† *P. maritima*, L.
† * *Chenopodium album*, L.
† * *Rumex crispus*, L.
† * *R. Acetosella*, L.
† * *Polygonum aviculare*, L.
† * *P. Persicaria*, L.
† *P. sagittatum*, L.
† *Urtica gracilis*, Ait.
† *Myrica cerifera*, L.
Betula papyrifera, Marsh. (a few trees and a good many seedlings where spruces have been cut down).
† *Alnus viridis*, DC.
Populus tremuloides, Michx.
† *P. balsamifera*, L.
† *Picea alba*, Link.
† *P. rubra*, Link.
Abies balsamea, Miller (more young than old growth).
† *Juniperus communis*, L., var. *canadensis*, Loud.
† *J. Sabina, L., var. procumbens*, Pursh.
Liparis Loeselii, Richard.
Spiranthes cernua, Rich. (on good authority: not seen).
† *Pogonia ophioglossoides*, Nutt.
† *Iris versicolor*, L.
† *Sisyrinchium angustifolium*, Mill.
† *Maianthemum Canadense*, Desf.
Streptopus roseus, Michx.
Medeola Virginiana, L.
Typha latifolia, L.
Arisaema triphyllum, Torr.

Acorus Calamus, L.
Carex folliculata, L.
C. intumescens, Rudge.
C. rostrata, Stokes.
C. lurida, Wahl.
C. maritima, Müll.
C. crinita, Lam.
C. debilis, Michx., var. *Rudgei*, Bailey.
C. flava, L.
C. flava, L., var. *pumila*, Coss.
C. pallescens, L.
C. conoidea, Schk.
C. aurea, Nutt. (Very unusual away from slate along the rivers of the interior.)
C. leptalea, Wahl. (*C. polytrichoides*, Muhl.)
C. stipata, Muhl.
C. sterilis, Willd., var. *excelsior*, Bailey.
C. canescens, L., var. *vulgaris*, Bailey.
C. trisperma, Dewey.
C. foenea, Willd.
C. straminea, Willd., var. *aperta*, Boott.
† *Equisetum arvense*, L.
† *E. sylvaticum*, L.
Polypodium vulgare, L.
† *Pteris aquilina*, L.
† *Asplenium Filix-foemina*, Bernh.
† *Phegopteris polypodioides*, Fée.
P. hexagonoptera, Fée.
† *Aspidium Thelypteris*, Swartz.
† *A. spinulosum*, Swartz.
† *Onoclea sensibilis*, L.
† *Osmunda regalis*, L.
O. Claytoniana, L.
† *O. cinnamomea*, L.

Lexington, Mass.

[It is worth while to compare the foregoing list with the plants found upon Mt. Desert Island, some sixty miles to the northeast. Of the species which Miss Cook has found upon Monhegan the following have not been seen upon Mt. Desert or the neighboring islands, — *Helianthemum majus*, *Rhus copallina*, *Gentiana crinita*, *Phegopteris hexagonoptera*, and *Carex aurea*, although the latter is reported from Eagle Island in Penobscot Bay. *Menyanthes*, while abundant upon Great Cranberry Isle, is rather rare upon the main island of Mt. Desert; *Cerastium arvense* has been found only upon the Duck Islands some distance seaward; and though *Ranunculus bulbosus* occurs on Mt. Desert it is as yet very rare. On the Duck Islands, as on Monhegan, *Taraxacum erythrospermum* is more abundant than *T. officinale*. *Aster cordifolius*, formerly known only at Somesville, the oldest permanent settlement on Mt. Desert, has recently established itself at more than a dozen points upon the Island and is spreading rapidly. — E. L. R.]

Vol. 3, No. 29, including pages 93 to 146 and plate 24, was issued 20 May, 1901.

C. E. Faxon del.

Fig. 1–4, Carex katahdinensis. Fig. 5–7, C. conoidea.
Fig. 8–10, C. oligocarpa.

Rhodora

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THOMAS CONRAD PORTER.

THOMAS MEEHAN.

IN the death of Dr. Porter, a high priest in botany passes away, and the science loses one of its brightest ornaments. It is a serious blow to American botany.

He was born in Alexandria, a small village in Huntington County among the Allegheny Mountains of Pennsylvania, on January 22d, 1822. In due time he entered Lafayette College at Easton, Pennsylvania, and graduated in 1840. With a predilection for the ministry he took a course in the Princeton Theological Seminary, and in 1843 was ordained a minister. His love for natural history, however, in time induced him to leave his ministerial calling. In 1849 he accepted the Professorship of Natural History in Marshall College, and in 1853 the same position in Franklin College at Lancaster. Finally in March 1866 he was offered by his Alma Mater, Lafayette College, the chair of Botany and Zoology, a position which he accepted and occupied from the following September until his death on the April 27th last. He received the honorary degree of Doctor of Divinity, and later that of Doctor of Laws.

The circumstances attending his passing away are pathetic. For some time he had been complaining of what he supposed to be dyspepsia, regarded by him only as something that interfered with active work. At the last hour he was writing to a friend, Benjamin H. Smith of Philadelphia, that his physical condition was too weak for much bodily exertion, but with the return of spring he should revive, and proposed an excursion to the Pocono mountains at the end of May. Having written thus far, he was interrupted by his housekeeper, — Mrs. Porter had died about two months previously,

—who came to his study to inquire if he was ready for supper. In ten minutes she returned to announce that it was on the table. The letter to his friend was unfinished, — he was dead!

Dr. Porter was a man of remarkably broad education. He was well acquainted with both modern and classical languages. A poet of no mean power, he was especially fond of translating German hymns into English verse, and many of his own poems are of high worth. He was by no means a specialist, but was an adept in the leading branches of physical as well as natural science. His chief love, however, was for botany, in which mainly his distinguished reputation was so well earned. Early in his career he planned the preparation and publication of a complete Flora of Pennsylvania. It was hoped that this would appear in the reports of State Geological Survey, but he was not satisfied with the conditions of publication. His great desire to have everything as complete as possible kept him continually thinking that more was yet to be done. His journeyings to and fro through the State, and his voluminous correspondence with those who showed any disposition to assist him in securing exact information in regard to the plants of the region, was remarkable. Indeed the earnestness and completeness with which he answered inquiries from his correspondents was a rare feature in his character. He rarely complained of the inroads on his time, but on one occasion thought he might exposulate a little. As the question discussed is still a mooted one, it may not be out of place to quote: —

"Because I am a Professor of Botany, does it follow that I must know everything about plants? Must I be exposed to a perpetual fire of questions and cross-questions? Can I take my 'davy that the fronds of *Asplenium pinnatifidum* never root at the tips? All I can say is that I have never seen them do it, and I have seen a goodly number in their native haunts. Perhaps they fail in the same manner that some men are virtuous for lack of opportunity. Protruded from the crevices or pockets on faces of cliffs, they encounter the dry rock only, and get no encouragement to go walking further as *Camptosorus* does, which grows in less dry places. If the conditions were changed, the *Asplenium* might behave as the *Camptosorus*, who can tell?"

Although he died before his Flora of Pennsylvania appeared in print, it is a satisfaction for the sake of his memory, and for bot-

any to know that he regarded it as practically finished, and was about to send the first installment of copy to the printer, Mr. A. A. Heller of Lancaster; and that it is understood his nephew, Dr. J. K. Small, will edit the work.

Dr. Porter's "Flora of Colorado" published as part of Hayden's Survey of the territories, was long the only hand-book for botanists in that region. A number of species have been named in his honor, as well as the genus *Porterella*, so named by Dr. Gray.

As a member of an excursion party his boundless enthusiasm became the life of the company. It is among the proudest memories of a young botanist's life to have been on such a trip with Dr. Porter. Although like most persons who are slow to make up their minds until they have the actual facts before them, he was very positive in defending an opinion once formed, yet he gladly welcomed any new fact from even the humblest source. Few will forget the intense pleasure his discovery in 1867 of *Sedum Rhodiola* on the face of cliffs two hundred feet above the Delaware River, gave to him as a proof of its glacial deposit there ages ago.

With the passing away of Torrey, Engelmann, Gray, Chapman, Porter and other botanists, of the last generation, readily recalled an era in American botany closes.

GERMANTOWN, PENNSYLVANIA.

NOTES ON THE ERICACEAE OF NEW ENGLAND.

WALTER DEANE.

As two years have passed since the publication of the Preliminary List of New England Plants, — I, dealing with the *Ericaceae* (RHODORA, I, pp. 93–94), it seems best to make such additions and corrections as will bring the List to date and represent our knowledge of the New England representatives of the family at the present time. The genera here, as in the list, are arranged alphabetically.

Gaylussacia dumosa, Torr. & Gray. Through the kindness of Mr. A. A. Eaton I have received a specimen of this species collected by him at French's Pond, North Hampton, New Hampshire, in 1898, where it is "tolerably abundant." A cross can now mark this in my

list. Mr. Eaton has already recorded this species from a bog in Nottingham, New Hampshire, in Rhodora, II, p. 168.

Gaylussacia dumosa, var. *hirtella*, Gray. Mr. M. L. Fernald has kindly called my attention to the fact that the specimens on which I based my Massachusetts and Rhode Island records of this variety, so named by Wm. Boott and S. T. Olney on the sheets containing the specimens in the Gray Herbarium, have not the glandular-hirsute or hispid character that properly belongs to this form and is exhibited in plants from further south. This name accordingly should be dropped from my list.

Gaylussacia resinosa, var. *glaucocarpa*, Robinson. I have visited several times the type locality of this plant in Jaffrey, New Hampshire, and was pleased to see the article by Dr. B. L. Robinson in Rhodora, II, pp. 81–83, in which he gives varietal distinction to this blue-fruited form of our common huckleberry. In Rhodora II, p. 168, Mr. A. A. Eaton states that *glaucocarpa* "is more abundant in the coast towns of Rockingham county, New Hampshire, than the type; the fruit is larger, juicier and more generally esteemed." This shows that the plant is well recognized by the country people at large. Dr. C. B. Graves has kindly sent me specimens of this variety collected by him in Waterford and Groton, Connecticut, in August, 1898. In reply to my inquiries in regard to the relative size of the fruit, abundance and general distribution of the plant, Dr. Graves writes under date of March 3, 1901, "With regard to the berries of *glaucocarpa*, I should say that on the whole and as a rule when fully grown they were quite as large as those of the species. I have seen some very large berries. . . . I should call the plants abundant at the points where I have noticed them. As a rule they grow in little irregular patches of eight or ten square yards, with little or no admixture of the species, which, however, usually grows near by. Much more rarely in my experience they grow mingled together. For table uses they seem to me just as good as *G. resinosa* and I could detect no difference either in flavor or in relative seediness." I have also seen in the Gray Herbarium and that of Mr. J. H. Sears of Salem, specimens of *glaucocarpa* from Topsfield, Massachusetts, collected in June and July, 1899, by Mr. Sears and referred to by Dr. Robinson together with Dr. Graves' plants, in his paper on the subject. I am glad to report this variety from Maine also. Mr. E. L. Rand has shown me specimens in his herbarium from the Island of Mt. Desert,

Maine, collected by him, on September 7 and 8, 1896, on Ox Hill, Seal Harbor; on the Western Triad, and in a clearing near Jordan Pond. These points are within two or three miles of each other. The plant is evidently distributed widely over the Island, for Mr. Rand says that the berry pickers whose occupation takes them over widely separated localities seem to be well acquainted with this blue variety and to recognize its large size in comparison with the common form. This places a cross against Maine, New Hampshire, Massachusetts and Connecticut in my list. Such a wide distribution having been found for this blue-fruited huckleberry in so short a time since its first publication as a variety, doubtless it is widely scattered over all the New England States.

Gaylussacia resinosa, forma *leucocarpa*, Britton. I find in the Gray Herbarium a specimen of this white-fruited form of our common huckleberry, collected in August, 1892, at Brunswick, Maine, by Miss Kate Furbish who states on the label accompanying the plant that the berries are white and translucent. See Porter, Torr. Bull., XVI, 1889, p. 21, and Britton, Torr. Bull., XVII, 1890, p. 125. This name should be introduced with a cross in my list.

Kalmia glauca, Ait. Mr. E. B. Harger collected this species in Woodbury, Connecticut, May 26, 1899, and recorded it in RHODORA, II, p. 125. I have seen his specimens in the Herbarium of the New England Botanical Club and a cross should represent it in my list. Mr. J. N. Bishop has sent me specimens of the same species which he collected at Burlington, Connecticut, on June 3, 1900. He says that the plants were very abundant. *Kalmia glauca* was reported from Spectacle Ponds, Kent, in the same state, by Mr. C. K. Averill in RHODORA, I, p. 40.

Kalmia latifolia, L. This species was credited by me to Vermont in RHODORA, I, p. 136. This state should be represented by a cross in my list.

Loiseleuria procumbens, Desv. This northern species was found in various localities on Mt. Katahdin, Maine, in July, 1900, by Messrs. J. R. Churchill, M. L. Fernald, and E. F. Williams. I have seen specimens in Mr. Fernald's and Mr. Churchill's herbaria. A cross should represent it in my list.

Pyrola rotundifolia var. *uliginosa*, Gray. Mr. Fernald has collected this variety in a bog in Crystal, Aroostook County, in the northern part of Maine, in August, 1900. I have seen it in his herbarium. This should be marked with a cross in my list.

Rhododendron canescens, Michx. This species is found in New Hampshire, Vermont, Massachusetts and Rhode Island as far as my examination has gone. I have studied the following specimens: — New Hampshire, Walpole (*M. L. Fernald*), Jaffrey (*E. F. Williams*): Vermont, Manchester (*Mrs. W. H. Graham & Mary A. Day*), Lake Dunmore (*Ezra Brainerd*), West Rutland (*E. F. Williams*): Massachusetts, Concord (*H. Mann*), Ashburnham (*S. Harris*), Montague (*J. R. Churchill*), Mt. Toby, Leverett (*J. R. Churchill*), Pittsfield (*W. Oakes*): Rhode Island, Providence (*G. Thurber*). These states should each be represented by a cross in my list.

Rhododendron nudiflorum, Torr. This species is found in Massachusetts, Rhode Island and Connecticut as far as I have been able to find out. I have examined specimens from Massachusetts, Dedham (*H. A. Young*), Norwood (*E. F. Williams*): Rhode Island, Warwick(*J. F. Collins*), Providence(*G. Thurber, J. F. Collins*): Connecticut, Bridgeport (*E. H. Eames*), Southington (*L. Andrews*). These three states should each be represented by a cross in my list.

In studying these species it has been impossible to see the types, and I have accordingly availed myself of the best and most reliable descriptions that I can find in which the important characters are clearly contrasted. These are in the Illustrated Flora of Britton and Brown. In all the cases above mentioned the specimens bear out well the characters as drawn, but I have seen several in which there is an admixture of the characters of the two species which I think it worth while to cite. In specimens from Townsend, Massachusetts; Cranston, Rhode Island (*J. F. Collins*), and Southington, Connecticut (*C. H. Bissell*), the plants are *nudiflorum* with the flowers of *canescens*, having the tubes densely glandular. In the Herbarium of Brown University there is a specimen from the Herbarium Olneyanum, with no other locality than Rhode Island, exhibiting the same peculiarities. In a specimen from near Bellefont, Rhode Island (*J. F. Collins*), the plant is *canescens* but the pedicels are strigose, a character belonging to *nudiflorum*, the pedicels of *canescens* being glandular. In a specimen from Southington, Connecticut (*L. Andrews*) the leaves of *nudiflorum* are combined with the densely glandular fruit and pedicels of *canescens*.

Such a marked interchange of characters in these two species as is indicated in the above specimens presents a subject worthy of much careful consideration. Their validity as distinct species is

called into question or else the characters must be very differently drawn. Observers in the field should examine these plants wherever met with, and I should be very glad to receive specimens or notes from any part of New England that will throw light on the constancy or inconstancy of *Rhododendron canescens* and *nudiflorum*.

Rhododendron viscosum, var. *nitidum*, Gray. Dr. E. H. Eames has sent me for examination a specimen of the above variety, with small shiny leaves, an inch or less in length. The plant compares well with specimens in the Gray Herbarium. It was collected by Dr. Eames at Huntington, Connecticut, on September 11, 1893, and was "abundant in a large peat bog, with *Vaccinium Oxycoccus*, L. and *V. corymbosum*, L., etc., while with it grows *Gaylussacia dumosa* (the only station known to me in this vicinity) with the usual plants of such situations." This is the second New England station that I know of for this variety, which must now be entered in my list with a cross.

My authority for the occurrence of *Rhododendron viscosum*, var. *nitidum* in Massachusetts is the Flora of Nantucket, published by Mrs. M. L. Owen in 1888. Mr. L. L. Dame discovered the plant near Sesachacha, and he writes me that Dr. Asa Gray named the specimen which was for some reason not preserved.

Vaccinium corymbosum var. *atrococcum*, Gray. Pres. Ezra Brainerd has shown me a specimen of this form, collected on the margin of Bristol Pond, Bristol, Vermont, July 5, 1898, by Mr. A. C. Dike, and recorded in the Flora of Vermont by Brainerd, Jones and Eggleston, 1900, p. 68. This must now have a cross against it in my list.

Vaccinium pennsylvanicum, var. *angustifolium*, Gray. Dr. C. B. Graves discovered this alpine form of our common Dwarf Blueberry in a sphagnous meadow near the edge of Great Cedar Swamp, in Voluntown, Connecticut, on June 17, 1899, and published it in RHODORA, III, p. 65. I have examined specimens of the plant deposited in the Gray Herbarium. It is a singular jump from the high mountain tops of Maine, New Hampshire and Vermont to a spot in Eastern Connecticut but 260 feet above sea level. In reply to my inquiry as to its habitat, relative abundance, etc., Dr. Graves writes under date of March 16, 1901, "Great Cedar Swamp is an extensive white cedar swamp bordering Pachaug River and its branches in Voluntown. The point where I found the *Vaccinium* was on the eastern edge where some woody growth, bushes and small trees, red maples, etc., had been cut off, leaving a small and low knoll a little less wet

than the sphagnous meadow which surrounded it except on the landward side. . . . There was a small patch a yard or so square with only a few plants. I do not remember seeing any of the ordinary form there. Associated plants were *Lonicera caerulea*, *Rhodora canadensis*, *Carex vestita*, while near by were *Ilex glabra*, *I. laevigata*, *Azalea viscosa*, var. *glauca*, *Nemopanthes fascicularis*, *Arethusa bulbosa*, *Carex bullata*, *stricta*, *filiformis*, *Eriophorum paucinervium* and others. I cannot account for its presence here; certainly the cutting off of the woodland would not explain it. Some of the plants mentioned are also northern, and in another portion of the swamp I found *Chiogenes* and *Clintonia borealis*, both rare in this county; also *Cornus canadensis*." A cross should mark this in my list.

Vaccinium pennsylvanicum, var. *nigrum*, Wood. Mr. J. R. Churchill collected on July 17, 1886, in the Blue Hills Reservation, Quincy, Massachusetts, the typical form of this species with blue berries, and near by the variety with black berries without bloom. The contrast between the two forms was noted at the time. I have seen these specimens in Mr. Churchill's herbarium.

Mr. W. W. Eggleston collected this form on Twin Mountains, West Rutland, Vermont, on July 1, 1899, and recorded it in the Flora of Vermont, 1900, p. 69. I have seen Mr. Eggleston's specimens both in Dr. Brainerd's herbarium and my own. These two states should each be represented by a cross in my list.

Cambridge, Massachusetts.

SCUTELLARIA PARVULA AND S. AMBIGUA.

M. L. Fernald.

The dwarf skullcap, although not a common plant in New England, is known at a few stations in Maine, Vermont and Connecticut. The Maine and Connecticut plant, however, differs in one striking characteristic from specimens from Lake Champlain and adjacent Quebec; the former being minutely puberulent or glabrate, the latter densely pubescent with spreading viscid hairs. Examination of herbarium material shows that both these forms are widely distributed in North America, and an attempt to place them satisfactorily has brought to light an interesting history.

Michaux published *Scutellaria parvula*[1] in 1803 characterizing it as follows: "S. pusilla: dense pubescens: foliis ovalibus, integris, omnibus conformibus: floribus axillaribus. *Obs.* Affinis *S. minori.* Folia sessilia, parvula, ima interdum subdentata. *Hab.* in regione Illinoensi et Canada."

Pursh, although he cited an additional region (Virginia) for the plant, added nothing important to the characterization of the species, for he quoted Michaux's description. Sir William Hooker, however, published a plate of the species in 1825, and although in the drawing the pubescence of the stem is not brought out, that character is emphasized in his description: "*plant* everywhere covered with short glandular pubescence."[2] The ample description made apparently from material collected in Canada either by Mrs. Shepard, Mr. Goldie, or Dr. John Richardson agrees in detail with the Lake Champlain plant and with Quebec specimens in the Gray Herbarium collected by Mrs. Shepard, herself (whose plant is cited by Hooker in his Flora Boreali-Americana) and by Macrae. This plant, a common species in Illinois and the only form known to us from Quebec, may be taken without hesitation to represent the true *S. parvula* of Michaux collected, "in regione Illinoensi et Canada." It is not restricted, however, to these regions, but as already stated has a broad range, from Quebec and northern Vermont to Michigan (and the Saskatchewan?) south to Tennessee and Texas.

The other form, the smoothish plant of Maine and Connecticut, is likewise of broad range, and it was first described by Nuttall, in 1818, as *Scutellaria ambigua*, "Stem 4 to 6 inches high, smooth, mostly purple."[3] It was soon reduced, however, to *S. parvula*, and since the publication of Hooker's Flora Boreali-Americana it has apparently remained in unmerited but uninterrupted oblivion. Under the name *S. parvula* both the smoothish and the glandular-hairy plants passed among American botanists until the publication of the Synoptical Flora. There, although he still followed the tradition of treating both the common forms as *S. parvula*, Dr. Gray described as var. *mollis* a very hairy and overgrown plant of the Mississippi bottoms. Although these plants of Dr. Gray's var. *mollis* are much larger (nearly 3 dm. high) and stouter

[1] Michx. Fl. ii. 11.
[2] Hook. Exot. Fl. ii. t. 106.
[3] Gen. ii. 37.

and with larger leaves than in specimens of less favored soils, they cannot be otherwise separated from the very pubescent plant left by him to represent in part true *S. parvula.*

That the very pubescent *S. parvula* of Michaux and the smoothish plant associated with it are marked extremes there can be no doubt, but, differing only in the degree of pubescence and in an inconstant tendency in the leaves, they seem better treated as varieties than as distinct species. The smoothish plant, which has been carefully identified with Nuttall's type kindly placed at the writer's service by Mr. Stewardson Brown of the Philadelphia Academy of Sciences, should take as its varietal designation the name given it by Nuttall as a species.

In the Botanical Club Check List Dr. Britton raised to specific rank Dr. Gray's *Scutellaria parvula*, var. *mollis*, the overgrown pubescent plant of the Mississippi valley, and he gave it the specific name *S. campestris.*[1] That this large form has nothing but its size to distinguish it from the ordinary pubescent plant we have already stated, and this view is supported by Dr. Britton's treatment of the two forms in the Illustrated Flora. There *S. parvula* is described as "glabrous, or slightly pubescent," and *S. campestris* "densely pubescent all over." Thus it seems that the name *S. campestris*, Britton, was intended to cover not merely the large *S. parvula*, var. *mollis*, Gray, but all the forms which are "densely pubescent all over." If, however, we are to treat the two forms as specifically distinct, we must take for the smooth plant of the Illustrated Flora (*S. parvula*, Britton) its Nuttallian name *S. ambigua*; and to the pubescent plant, recently described by Dr. Britton as a new species, we must apply Michaux's name *S. parvula*, given to the plant which is "dense pubescens," or as expressed by Hooker "everywhere covered with short glandular pubescence."

The two forms, which in their extremes may usually be recognized, are distinguished as follows:

S. PARVULA, Michx. Plant strongly stoloniferous and producing moniliform tubers: stems simple or branched, mostly clustered, 0.8 to 3 dm. high, pubescent with spreading often viscid hairs: leaves ovate or ovate-oblong, more or less pubescent, entire or sparingly toothed, at most 1.2 cm. broad, all but the lowest sessile: flowers axillary, the pedicels about equalling the hairy calyx: corolla

[1] Mem. Torr. Club, v. 283.

slender, blue, 0.5 to 1 cm. long: seeds strongly papillose. — Fl. ii. 11; Hook. Exot. Fl. ii. t. 106, & Fl. Bor.-Am. ii. 115; Gray, Syn. Fl. ii. 380 (in part) including var. *mollis*. *S. campestris*, Britton, Mem. Torr. Club, v. 283, & in Britton & Brown, Ill. Fl. iii. 82, fig. 3084. — QUEBEC, without locality (*Mrs. Shepard*, *Macrae*): VERMONT, North Ferrisburg, June, 1881 (*E. & C. E. Faxon*); dry barren soil, Burlington, July, 1894 (*L. R. Jones & W. W. Eggleston*), June, 1896 (*A. J. Grout*): NEW YORK, Dexter (*Alphonso Wood*): OHIO, limestone soil, Ottawa Co., June, 1895 (*E. L. Moseley*): MICHIGAN, without locality (*Houghton*); Iona, 1877 (*E. F. Smith*): ILLINOIS, Fulton Co. (*J. Wolf*); sandy banks of the Mississippi, Oquawka, June, 1873 (*H. N. Patterson*): TENNESSEE, open woods, Henderson, May, 1893 (*S. M. Bain*, no. 38): MISSOURI, St. Louis, April, 1844 (*G. Engelmann*); Montier, May, 1894 (*B. F. Bush*, no. 316): TEXAS (*Wright*, &c.). Passing to

Var. **ambigua**. Stem and leaves sparingly appressed-puberulent or glabrate: leaves often more oblong and entire, but sometimes ovate and toothed. — *S. ambigua*, Nutt. Gen. ii. 37. *S. parvula*, authors, in part; Britton l. c. 81, fig. 3083; not Michx. — MAINE, gravelly bank, Dover, Sept. 1896 (*M. L. Fernald*, no. 466); exsiccated clay soil, North Berwick, July, 1895 (*J. C. Parlin*, no. 305): CONNECTICUT, East Haven, 1855 (*Geo. Thurber*): PENNSYLVANIA, woods, Schuylkill River (Herb. Acad. Nat. Sci. Phila.): OHIO, dry and open forests — *type* (*Thos. Nuttall*, Herb. Acad. Nat. Sci. Phila.): KENTUCKY, Lexington, 1835 (*C. W. Short*): ILLINOIS, without station, 1845 (*S. B. Mead*); near Oquawka, Aug. 1873 *H. N. Patterson*): WISCONSIN, Milwaukee (*I. A. Lapham*); Madison (*T. J. Hale*): IOWA, Ames, June 1897 (*R. Combs & C. R. Ball*): MISSOURI, Independence, May, 1894 (*B. F. Bush*, no. 825): KANSAS, prairie, Riley Co., May, 1895 (*J. B. Norton*, no. 411): LOUISIANA (*Hale*): TEXAS, (*E. Hall*, no. 453).

GRAY HERBARIUM.

LYSIMACHIA PUNCTATA IN EASTERN MASSACHUSETTS.—*Lysimachia punctata*, L., which although not mentioned in the 6th edition of Gray's Manual, is illustrated in Britton and Brown's Flora, has been found growing in a wild state at Brockton Heights near the Easton line. It was first discovered here in the summer of 1900. This is one of the rarest of the genus, the only other station known for this species near here being at Whitman, Massachusetts. The few plants found near Easton are unfortunately in danger of extermination by enthusiastic plant hunters of this vicinity.—ARTHUR CLARK, North Easton, Massachusetts.

NOTES ON THE EMBRYOLOGY OF SOME NEW ENGLAND ORCHIDS.[1]

R. G. Leavitt.

(Plate 33.)

Owing to the fact that work on the native orchids was planned late last season, the material at present in hand represents only advanced stages in the development of the embryo in most cases. Yet even this has shown some things that are of considerable interest. The remarkable diversity which prevails in orchids with respect to the suspensor is well illustrated; and the ripened seeds have shown so many instances of polyembryony of a particular type that one might suspect such polyembryony of being a family characteristic.

Goodyera tesselata and pubescens. The embryos of both these species (Figs. 1, 3, 4) seem to lack the suspensor. That such is the case with *G. pubescens* is clearly indicated by the few-celled stage represented in Fig. 3. The hemispherical terminal cell (*c*) doubtless represents the suspensor: but it goes to form a permanent part of the embryo proper. In *G. discolor*, according to Treub,[2] this cell pushes out of the embryo-sac, elongates to thrice the length of the mature embryo, and serves to bring food-matters from the basal region of the developing seed, to the coat of which it is closely applied, though it does not reach the ovary wall itself, the source of supplies.

Listera ovata and *Epipactis palustris* are figured by Treub[3] and are shown to develop no suspensor. So that we have with *Spiranthes cernua* and the (probable) case of *Goodyera pubescens* representatives of four nearly related genera in which all cells derived from the fertilized egg are included within the germ itself. Usually in angiosperms the egg-cell after fertilization divides transversely into two cells. The one toward the centre of the sac ("embryo-cell") ultimately gives rise to a large part, and sometimes to the whole, of the embryo proper. The other produces the suspensor, generally a row of cells attached by the end to the wall of the sac, and acting to

[1] Continued from p. 63.

[2] Notes sur l'embryogenie de quelques Orchidées, pl. IV.

[3] Op. cit., pl. II., III.

push the embryo down into the nourishing endosperm, or to draw nutritives from the nucellus. The suspensor finally perishes. Fig. 2 illustrates the usual differentiation of the new monocotyledonous individual into two regions, suspensor and "embryo proper"; though in this species (*Limnocharis emarginata*) the end-cell of the feeding-organ is uncommonly large. That the simplification of the germ, characteristic of the orchid family, should in the above named species include the omission of so radical a step in early development as the differentiation of the embryo into temporary and permanent regions, is a noteworthy feature of the embryogeny.

Polyembryony. Occasional doubling of the embryo has been noted heretofore in a small number of orchid species, including representatives of *Cypripedium*, *Orchis*, and *Gymnadenia*. I find twin embryos in both the present species of *Goodyera.* Apparently here as in certain ascertained cases both embryos originate in the same sac, though I have seen examples only in the ripe seeds. However, both are often plainly invested by a common membrane, probably the remains of the sac with contiguous cells. Strasburger supposed that in the double-embryoed species there are occasionally two egg-cells in the same sac.

The percentage of polyembryonous seeds must be very small, though I have been able to find from one to three or four instances in each slide of seed examined. The close appression of the embryos — one being smaller than the other and lying more or less in a concavity of the larger one — makes it rather hard to distinguish the twin-seeds from the rest. It should be mentioned that supposed hybrid seed (from pollen of *G. tesselata* upon *G. pubescens*) gave a much larger proportion of twins than seed of either parent.

Aplectrum hiemale. Double embryos (Fig. 7) occur about as frequently as in the *Goodyera* species. Both members of the pair have the remains of suspensors (*s*). This fact is important as indicating similarity of origin, and precluding the idea that doubling results from fragmentation of an original single embryogenic mass.

Corallorhiza multiflora. As seen in the nearly ripened seed (Fig. 8) the suspensor (*s*) comprises two very long cells. It is plainly an organ of absorption, for it passes out of the exostome and plunges its tip into the tissue of the placenta.

I have found, after much looking, a single two-embryoed seed. The embryos were very closely pressed together, but each had its suspensor.

Habenaria tridentata. In diembryonic seeds, which are not uncommon, the embryos lie side by side (Fig. 6), have separate suspensors (*s*), and are similarly oriented.

Habenaria blephariglottis. When two embryos are present (Fig. 5), they are plainly to be seen, as one lies ordinarily a little above the other and both embryos keep their roundness well. The proportion of twin-seeds is small.

This species shows a somewhat striking elaboration of the suspensor, which comprises at least six or seven cells (Fig. 10). Nearly all the cells emit processes, some short and fingerlike and reaching out laterally to the seed-coats or placenta, others filamentous and running parallel with the body of the suspensor into the tissue at the base of the seed-stalk. All these prolongations are filled with dense protoplasm. The processes of the terminal cells are insinuated between the cells of the placenta. The whole apparatus seems to be a well-devised instrument of nutrition.

The embryo lies at the centre of the field which every now and then we hear characterized as peculiarly exempt from modifying influences. Features of the reproductive system, so it has been said, are relatively constant from group to group in any evolutionary series, as compared with characters of the vegetative system. Yet as a matter of fact the moulding forces reach even the embryo rather directly in many cases. Thus in the family under discussion the adaptive tendencies in the matter of seed-dispersal have worked first to reduce the size and specific gravity of the seed as a whole. The mature seed has but one coat and that is air-filled. Both perisperm (nucellus) and endosperm have been done away with. The germ itself has lost distinction of stem and leaf. Finally, in the absence of the usual means of feeding the growing embryo, complicated sucking-organs (suspensors) have often been developed; and the diversity which obtains within the limits of this one family in this respect is remarkable. In some tropical species, as for instance *Phalaenopsis grandiflora* (Fig. 9), the cells of the "suspensor" grow out in tubular fashion not only toward the exostome, but also in the opposite direction, so that the embryo proper is enveloped by the filaments.

With regard to twin-embryos, it should be noted that we now have them in both diandrous and monandrous divisions and in all the

tribes of the family. It is my purpose the coming summer to determine, if possible, the precise origin of the supernumerary embryo.

The Ames Botanical Laboratory, North Easton, Massachusetts.

Explanation of Plate 33. Fig. 1, twin embryos of *Goodyera tesselata*. Fig. 2 (after J. G. Hall), young embryo of *Limnocharis emarginata*. Fig. 3, embryo of *Goodyera pubescens* while still composed of few cells. Fig. 4, twin embryos of same species. Fig. 5, twin embryos of *Habenaria blephariglottis*. Fig. 6, same of *H. tridentata*. Fig. 8, seed of *Corallorhiza multiflora*. Fig. 9 (after Treub), embryo with filamentous appendage, in *Phalaenopsis grandiflora*; *e*, the embryo proper. Fig. 10, the suctorial suspensor of *Habenaria blephariglottis*. In all cases *s* indicates the suspensor, or its remains.

Chloranthy in Anemonella thalictroides. — From Miss Emily T. Fletcher I have recently received an interesting specimen of *Anemonella thalictroides*, Spach. It has eight flowers in the usual umbelliform inflorescence, the central one being much shorter-stalked and somewhat larger than the rest. In all the flowers the sepals are small (2 to 4 mm. long) and green, instead of white and petalloid as usual. The stamens are all converted into sessile elliptic-oblanceolate green and sepaloid structures. They are 1.7 to 2.4 mm. long and rounded at the apex. The carpels are of the usual number and shape and are provided with stigmas of normal appearance. Miss Fletcher writes that the specimen was collected on the Bunce Farm at Westford, Massachusetts, where this peculiar form of the plant has been known to grow for six or seven years.

In the Gray Herbarium I find a specimen from Waterbury, Connecticut, collected and sent to Dr. Gray by Mr. W. H. Patton. In this plant the inflorescence seems originally to have been 6-flowered, although only three flowers have matured. Of these the central one, which is long-stalked and larger than usual (nearly 2 cm. in diameter) is completely transformed by chloranthy. The sepals are green although bordered with white. The stamens are represented by narrow flat elliptic-oblong slender-stiped structures, very different in their attenuate stipitate bases from those in the Westford plant. The carpels are also modified to very short and sessile but somewhat leaf-like members, quite destitute of stigmas.

I have found in literature only one mention of chloranthy in *Anemonella thalictroides*, namely in case of a plant exhibited at the Torrey Botanical Club by Dr. Arthur Hollick in 1881 (Bull. Torr. Club, viii. 60), which is described merely as having the sepals green. To what extent the other floral organs were modified is not stated, so it is impossible to tell whether it corresponded to either of the two forms here considered. Mr. Thomas Meehan (Bot. Gaz. v. 64) and Mr. George R. Kleeberger (Bull. Torr. Cl. vii. 97) have called attention to the occurrence of double flowers, both white and roseate, in *Anemonella thalictroides*. — B. L. Robinson, Gray Herbarium.

Extreme Variations of Alisma Plantago. — The common Water-plantain, *Alisma Plantago*, of marshy places has ovate or oblong leaves, and is known throughout the northern hemisphere. In Europe, besides this typical form, two well-marked varieties of the species have been recognized. These extremes, however, are not confined to Europe, but are occasionally found in northern regions of America. As they are likely to occur in the northeastern states and adjacent Canada, attention is here called to their peculiarities and to their present known stations in America.

Alisma Plantago, L., var. lanceolatum, Hoffm., Deutschl. Fl. (1800) i. 175. Plant usually small: leaves slender-petioled, lanceolate. Lake Superior (*Loring*): Lake Winnipeg Valley (*Bourgeau*): South Dakota, Black Hills (*E. Coues*): Idaho, Kootenai County (*Sandberg, MacDougal & Heller*, no. 935).

var. graminifolium, Wahlb. Fl. Ups. 122. Leaves mostly floating and linear. North Dakota, stagnant water, Leeds (*J. Lunell*). — M. L. Fernald.

THE HERBARIA OF NEW ENGLAND.

Mary A. Day.

(Continued from page 71.)

Brainerd, Ezra, Middlebury, Vermont. — President Brainerd has collected a herbarium of about 6000 species, which contains nearly all the North American ferns and Carices, and most species included in the Gray Manual. The collection is strong in the plants

of Vermont and contains much of the material upon which the recently issued Flora of Vermont by Messrs. Brainerd, Jones, and Eggleston was based.

Brewer, William Henry, New Haven, Connecticut.— Nearly all the private collection of Prof. Brewer has been given to the Department of Agriculture, Washington, but he retains a small unmounted portion. A nearly complete set of his plants of the Geological Survey of California is in the Gray Herbarium.

Brown University, Providence, Rhode Island. — The basis of this herbarium is the collection of Col. Stephen Thayer Olney which was given to Brown University before his death in 1878. Here also may be found the collection of Mr. James Lawrence Bennett, the smaller one of Dr. Brownell of Hartford, and a good fern collection of cosmopolitan range from Miss Anna Stout of New York. The herbarium contains about 40000 sheets and some 60000 specimens. It is well arranged although as yet only partially mounted. It is in charge of J. Franklin Collins, Curator.[1]

Bumsted, F. M., see Williams College.

Burt, Edward Angus, Middlebury, Vermont. — Dr. Burt commenced collecting specimens about twenty years ago while a student, but the larger part of his herbarium has been accumulated during the last eight years. Of phaenogams he has about 700 species collected by himself in eastern New York. The cryptogams are more fully represented and of wider range, the chief part being fungi, though lichens, mosses, and some algae are included. These are from United States and Europe. Dr. Burt is developing his herbarium along the lines of *Basidiomycetes*, *Ascomycetes*, and *Myxomycetes*, making it of special value as a working herbarium and including in this part about 500 specimens of the rarer European species. Among the collections represented are Calkins, North American lichens; Collins, Holden, & Setchell, Phycotheca Boreali-Americana; and Ellis & Everhard, Eleven centuries of North American fungi.

Carey, John. — The first collection which Mr. Carey made was destroyed by fire in New York. The American botanists endeavored to repair this loss, and another large herbarium was formed, critically studied, and carefully annotated. In 1869 Mr. Carey presented this collection to the Kew Gardens. It is therefore in charge of Sir W. T. Thiselton Dyer, Director of the Royal Gardens, Kew, England.

[1] The Herbarium of Brown University has just acquired by purchase the valuable collection of Prof. W. W. Bailey, described in Rhodora, iii. 69.

Chamberlain, Edward Blanchard, Providence, Rhode Island. — Mr. Chamberlain's herbarium contains about 2300 specimens, of which 1550 are phaenogams and vascular cryptogams, and 750 are mosses. The phaenogams were collected in Bristol, Lincoln County, or Brunswick, Cumberland County, Maine, and the mosses in the eastern part of the United States, though the larger part are from Maine.

Chadbourne, Paul Ansel. — The private herbarium of President Chadbourne was, during his life, deposited at Williams College. After his death it was purchased from his heirs and given to Bates College, Lewiston, Maine, where it now remains.

Churchill, Joseph Richmond, Dorchester, Massachusetts. — The herbarium of Judge Churchill contains about 5500 sheets, representing 2250 species and named varieties. Nearly all of them, probably 2200 species, are from the region covered by Gray's Manual; the remainder were collected by Judge Churchill in Florida in 1897, and in North Carolina in 1899. The unique feature of this herbarium is that not only were all the plants collected by Judge Churchill, but from the field to the mounted specimens all the work has been done by himself alone. He has made no exchanges and declined all gifts. Notwithstanding this, he has an almost complete representation of the New England flora, and many plants from the Middle and Southern States. The collection was begun in 1869, and much care has been taken to gather the plants in both flower and fruit, to make full specimens, and to have them accurately and fully identified. The herbarium is general so far as the flowering plants, ferns, and fern allies are concerned; the genus *Carex*, which numbers about 360 sheets, is perhaps exceptionally well represented.

Collins, Frank Shipley, Malden, Massachusetts. — This private collection has been accumulating for twenty years and represents the algae from all countries. It contains about 10000 sheets, and includes a full set of Collins, Holden, & Setchell, Phycotheca, Boreali-Americana. It is undoubtedly the best collection of algae in New England, with the exception of the Cryptogamic Herbarium of Harvard University.

(*To be continued.*)

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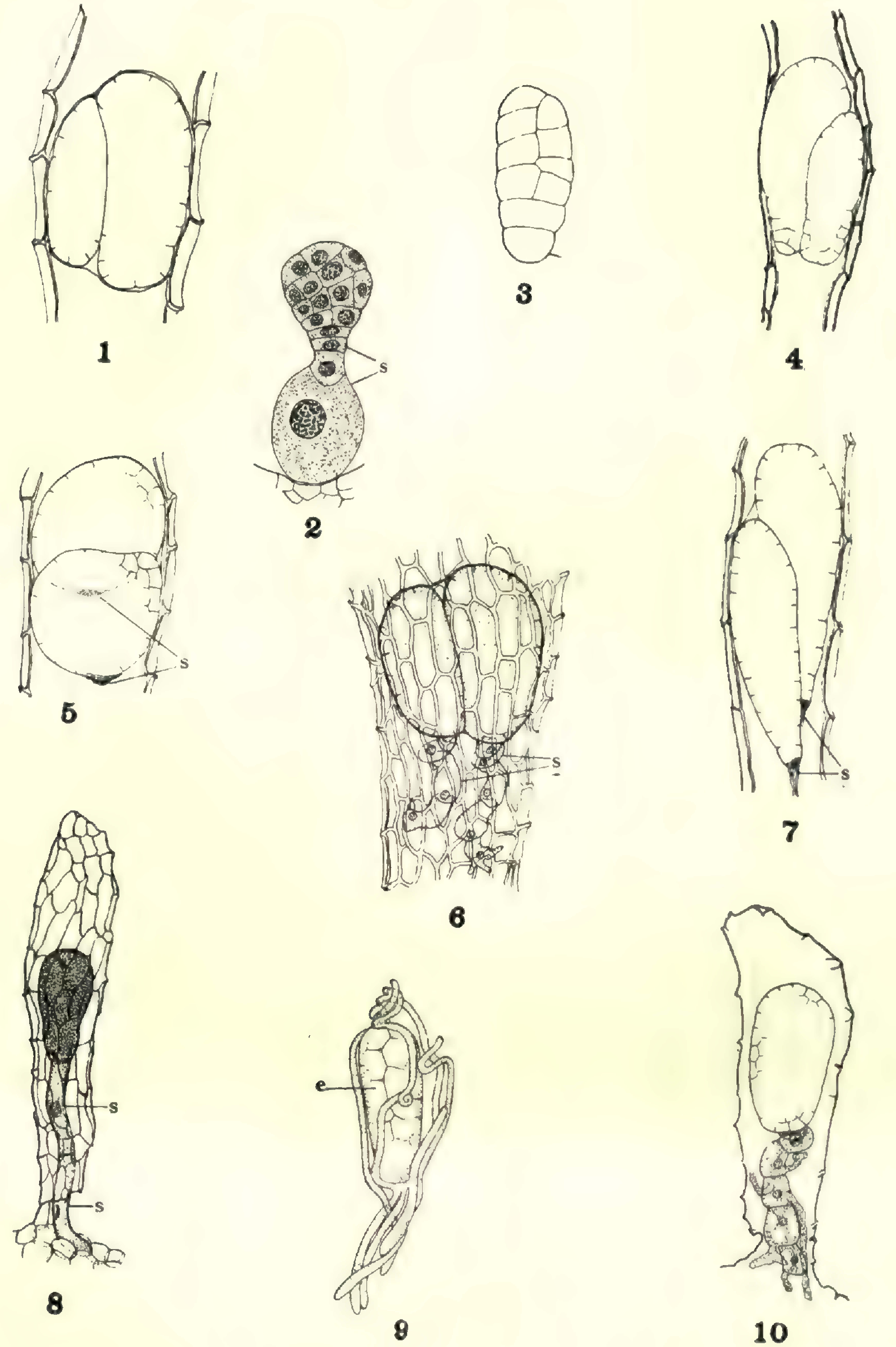

EMBRYOLOGY OF ORCHIDS.

Rhodora

JOURNAL OF

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NOTES ON THE UMBELLIFERAE OF NEW ENGLAND.

WALTER DEANE.

AFTER a lapse of just two years since the publication of the Preliminary List of New England Plants,— II. Umbelliferae (RHODORA, I, pp. 159–160), I have endeavored to revise the list and bring the corrections and additions to date. The genera are arranged, as before, alphabetically.

Berula angustifolia, Mert. & Koch. The authority for this species was wrongly ascribed to Koch.

Bifora radians, Bieb. By a typographical error the generic name was misspelled in my list.

Coelopleurum actaeifolium, Coulter & Rose. The *Coelopleurum* of Eastern North America must now be referred to this species. *C. Gmelini*, Ledeb., is confined to Alaska. Our New England plant was first described by Michaux, Fl. Bor. Am. I, 1803, p. 166, as *Ligusticum actaeifolium* (see North American Umbelliferae, Coulter & Rose, Washington, 1900, p. 142).

Conium maculatum, L. I have seen in the Gray Herbarium a specimen of this species collected by Mr. A. W. Driggs, in East Hartford, Connecticut, on June 26, 1899. A cross should be placed against this in my list.

Coriandrum sativum, L. Professor E. S. Burgess collected this species at Cottage City, Martha's Vineyard, Massachusetts, in August, 1893. Through the kindness of Dr. J. N. Rose I have been enabled to see one of Prof. Burgess's specimens deposited in the National Museum Herbarium in Washington. On the label I read, "Occasionally escaped from cultivation by the Portuguese." It should be represented in my list by a cross and I enter it as it is desirable to make a record of escapes which may become more or less established.

Crantzia lineata, Nutt. Mr. A. A. Eaton (Rhodora, II, p. 168) reports this species from Exeter and Newmarket, New Hampshire. He has kindly sent me specimens from the latter place, taken in August, 1899. A cross should represent this in my list.

Eryngium amethystinum, L. Judge J. R. Churchill found this species abundant in one locality in waste ground at the head of the beach, at Nahant, Massachusetts, on July 29, 1899. I have seen specimens from this locality in his herbarium, and I think it is worth while to record such escapes in view of their future behavior. It should be entered with a cross in my list.

Eryngium yuccifolium, Michx. This name should take the place of *E. aquaticum*, L. which has proved, through recent investigations, to be *E. virginianum*, Lam. (Britten & Baker, Jour. Bot. XXXVIII, 1900, p. 243.)

Foeniculum vulgare, Gaertn. Mr. Hubert Lyman Clark of Olivet College, Olivet, Michigan, has recorded in Rhodora, III, 1901, p. 88, his finding of the Fennel at Woods Hole, Massachusetts in 1899 and 1900. He did not preserve any specimens. Mr. Clark writes me under date of April 13 last, "The *Foeniculum* admitted of no doubts so I did not press any. I found it the last of July, 1899 and the 24th of July, 1900, at the same spot, but I can give you no further information about it, except that it was growing with other adventitious plants on a dump." A line under Massachusetts should be placed against this name in my list.

Hydrocotyle umbellata, L. I have seen in the Hérbarium of the New England Botanical Club a specimen of this species from Oxford, Connecticut, collected in September, 1885, by Mr. E. B. Harger, and recorded in Rhodora, II, p. 125. A cross should represent this in my list.

Ligusticum scothicum, L. By a typographical error this genus was referred to *Levisticum* in my list. The specific name should retain the letter "h", as found in L., Sp. Pl., I, 1753, p. 250.

Pimpinella Anisum, L. This species was wrongly ascribed in my list to Willdenow.

Sanicula canadensis, L. In Rhodora, II, p. 168, Mr. A. A. Eaton records this species from Seabrook and Kensington, New Hampshire among deciduous trees. He has kindly sent me a specimen from the Kensington locality collected by him in 1898, and I am glad to place a cross against the species in my list.

Sanicula gregaria, Bicknell. This species was collected in New Hampshire on the wooded banks of the Connecticut River, at Walpole on August 2, 1899, by Mr. M. L. Fernald. I have seen his specimens in the Gray Herbarium, and a cross should represent this in my list.

Sanicula trifoliata, Bicknell. This species was collected at Manchester, Maine, by Prof. F. Lamson-Scribner as early as 1873. A specimen is in the New England Botanical Club Herbarium where I have examined it. It has also been taken at Alstead, New Hampshire, by Mr. Fernald in 1899. I have seen a specimen from this locality and the two States should each be represented by a cross in my list.

Sium Carsonii, Durand. The more I see of this plant the more I am convinced that it is only an aquatic variety or mere form or state of *cicutaefolium*. The peculiar nondescript character of the leaves and entire plant in its extreme immersed form tends to this conclusion, and I have in my herbarium a series of specimens showing a complete gradation from the typical *cicutaefolium* to the typical *Carsonii*. The immersed form fruits much less frequently and, as is natural, the fruit is somewhat reduced but its size seems to depend upon the degree of immersion of the plant. The amount of variation in the shape of the leaves from *cicutaefolium* also depends upon the degree of immersion, and it all tends to show, to my mind, that *Carsonii* has been evolved from *cicutaefolium* and is certainly no more than a variety of it, as intermediate forms exist in abundance to show this connection.

Taenidia integerrima, Drude. This name should take the place of *Pimpinella integerrima*, Gray. Our native species has proved, according to the opinion of recent monographers, to be generically distinct from the old world *Pimpinella*.

Thaspium aureum, Nutt. (*Thaspium trifoliatum aureum* Britton). This species is credited to New England in the Monograph of the North American Umbelliferae, Coulter and Rose, Washington, 1900, p. 146, and to Rhode Island in Britton and Brown's Illustrated Flora, II, 1897, p. 518. Professor Coulter, Dr. Rose and Dr. Britton have kindly furnished me with information as to their authority for these statements. The reference to New England is either a mistake or it was based on tradition, and was made from previous records, as no specimens from New England have ever been seen by the authors of

either work. These records are readily traced to the Gray Manual, 6th edition, where the range is given as, "throughout the Atlantic States" etc. Now in the Revision of the North American Umbelliferae, Coulter and Rose, published in 1888, it is very clearly shown, on page 82, that great confusion has existed in regard to the species of *Thaspium* and that most herbarium specimens labelled *Thaspium aureum*, belong to the apterous fruited plants now included in the genus *Zizia*. There is not the slightest doubt that in this way *Thaspium aureum* was included in the Gray Manual, and this range has been copied into many of our local floras.

Dr. Britton has seen no New England *Thaspium aureum*, and his reference to Rhode Island is based upon "Plants of Rhode Island," J. L. Bennett, Providence, 1888, in which both *Thaspium aureum* and the variety *atropurpureum* are credited to the State. Bennett's statement as to the occurrence of the species in Rhode Island is doubtless based upon the same misconception, for no specimens from the State exist in the Herbarium of Brown University or in any private herbaria that I can find. I have examined a great many plants of so-called *Thaspium aureum* and of *Zizia aurea* from over New England with the kind assistance of Dr. Rose and every plant has turned out to be the latter species, *Zizia aurea*. For years past I have tried without success to see a New England *Thaspium aureum* either in the field or in an herbarium, and I feel very safe in saying that as far as we know at present the species does not grow with us. I trust that no future list will include this species as a New England plant unless an authentic specimen exists to prove the statement. I have spoken thus at length upon this subject as I think it is important to have a clear understanding as to the position of this species in New England, and I hope that it will stimulate an active search for *Thaspium aureum*, especially in the southern and western borders of our States.

Thaspium aureum, var. *atropurpureum*, Coulter & Rose. This form should stand as the earliest correct combination under the genus *Thaspium*, instead of *Thaspium atropurpureum*, Nutt. The sole authority for this variety as a New England plant is Bennett's Plants of Rhode Island, referred to above, where the plant is credited to "Warwick, Olney." As no trace of Olney's specimen can be found, if indeed it ever existed, and as the most diligent search of New England botanists has never brought this variety to light either before or since

Mr. Bennett's publication, I propose to drop the name from my list until actual specimens exist to prove its presence here.

Zizia aurea, var. *obtusifolia*, Bissell. This form was discovered by Mr. C. H. Bissell in Salisbury, Connecticut, on June 18, 1900, and published in RHODORA, II, p. 225. The type specimen is deposited in the Gray Hebarium where I have examined it. It should be entered with a cross in my list.

CAMBRIDGE, MASSACHUSETTS.

A SOCIETY FOR THE PROTECTION OF NATIVE PLANTS.

IN Boston and its suburbs a number of persons who take a keen interest in wild flowers have united to form a "Society for the Protection of Native Plants." The object of this society is to check the wholesale destruction to which many of our native plants are exposed, — a destruction often a matter of pure thoughtlessness in the excessive picking of flowers, and unnecessary pulling of roots, or an extensive collecting of flowers and plants for sale.

It is the intention of the society to publish brief articles, or leaflets, calling the attention of thoughtful people to the matter, and to point out what plants especially need protection and in what way the desired end may be best affected. These leaflets will be distributed to teachers in our schools, to flower missions and village improvement societies, and in such other places as it may seem that they will be effective.

This movement for the protection of native plants has the approval of the New England Botanical Club, which, as a body, feels keenly the loss or great reduction of many plants once more or less abundant in the neighborhood of our large cities.

For information in regard to the Society for the Protection of Native Plants, or its leaflets, application may be made to

MISS MARIA E. CARTER, Curator of Herbarium, Boston Society of Natural History, BERKELEY STREET, BOSTON, MASS.

PRELIMINARY LISTS OF NEW ENGLAND PLANTS VII,[1]— BORAGINACEAE.

Edward B. Chamberlain.

[The sign + indicates that an herbarium specimen has been seen; the sign — that a printed record has been found.]

	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
Amsinckia lycopsoides, Lehm.				+		+
Asperugo procumbens, L.				+		
Cynoglossum officinale, L.	—	—	+	+	+	+
" virginicum, L.	+	+	—	—		—
Echium vulgare, L.	+	+	+	+	+	+
Echinospermum Lappula, Lehm.	+	—	+	+		—
" Redowskii, var. occidentale, Wats.	+					
" Virginicum, Lehm.	—	+	—	+	—	+
Lithospermum arvense, L.	+	—	—	+	+	+
" officinale, L.	+	+	+	+	—	+
Lycopsis arvensis, L.	+			+	+	—
Mertensia maritima, S. F. Gray.	+	—		+		
Myosotis arvensis, Lam.	+		—	+	+	
" collina, Hoffm.				+		
" laxa, Lehm.	+	—	+	+	+	+
" palustris, Lam.			+	+	—	+
" verna, Nutt.	+	—	+	+	+	+
Onosmodium virginianum, DC.				+	+	+
Symphytum officinale, L.	+	+	—	+	+	+
" asperrimum, Sims.	+			—		

Notes upon the above list.

The *Amsinckia intermedia*, Fisch. & Mey., reported in the Flora Middlesex Co., Mass., as introduced around woolen mills, appears to be *A. lycopsoides*, Lehm.

Anchusa officinalis, L. has been found upon a dump at Providence, R. I., by Mr. J. F. Collins: there are specimens in Mr. Collins' herbarium, and in that of the New England Botanical Club.

[1] Printed in Rhodora as supplementary material.

Borago officinalis, L. A single collection of this plant at Lowell, Mass., in 1848 is recorded in the Flora Middlesex Co., Mass.; the specimen, in Herb. Bost. Soc. Nat. Hist., has not been seen.

Heliotropium curassavicum, L. was collected in 1897 by Mr. J. C. Parlin at No. Berwick, Me., in sandy soil made saline by the waste from a pickle factory; *H. europaeum*, L. is reported from Cambridge and Westford, Mass.; *H. indicum*, L. has been found at Cambridge, Mass., by Mr. Walter Deane.

Krynitzkia californica, Gray. (*Allocarya californica*, Greene.) A specimen of this plant (ticketed *Eritrichium oxycaryum*, Gray) is in the Herb. N. E. Bot. Club from wool waste at N. Chelmsford, Mass. (See Flora Middlesex Co. p. 75). The plant has also been found in similar situations at No. Berwick, Me., by Mr. J. C. Parlin.

Lithospermum angustifolium, Mx., and *Mertensia virginica*, DC., were introduced at Concord, Mass., by Mr. Minott Pratt, but have not persisted. (See Flora Middlesex Co. p. 76; and Rhod. **1**: 168.)

Myosotis collina, Hoffm. The plant from York Co., Me., reported as this species in Rhod. **1**: 76., proves to be *M. verna*, Nutt. *Myosotis collina* (*M. hispida*, Schlecht.) has blue flowers, the fruiting calyx about 2 mm. long with hooked pubescence and merely equalling the straight spreading pedicels. The plant is from 3–6 inches high, with spatulate or oblanceolate, hairy leaves which are clustered at the base of the stem. When in mature fruit the raceme is bractless, and much longer than the leafy part of the stem.

Onosmodium virginianum, DC. This plant appears to reach its northern limit, in New England, at about the southern boundary of Massachusetts. To the writer's knowledge the most northern station thus far reported is at Monson, Mass. (lat. 42° 5′–10′), given in Tuckerman & Frost, Catl. Pl. within 30 m. Amherst, (1875). Specimens have been seen from the following stations: Mass.; Centerville, Nantucket Id.: R. I.; Cranston, Providence, Smithfield: Conn.; New Haven, Fairfield. The plant has been reported also from New Bedford, Mass., and Southbury, Conn. Further information regarding its distribution is much desired.

Providence, Rhode Island.

Hottonia inflata: in Amesbury Massachusetts. Does it occur farther north? — I wish to ask through Rhodora for information as to the northern limit of *Hottonia inflata*. The range given in Britton and Brown's Flora is Massachusetts to central New York and south to Florida. As there is a colony of this plant growing in a pool here in Amesbury it seems likely that this station must be about the northern limit. Can any one inform me if it occurs farther north?

On the muddy banks of the same pool I have collected the interesting little moss *Bruchia Drummondii*, considered to be a southern species, I believe. — J. W. Huntington, Amesbury, Mass.

AERIAL RUNNERS IN TRIENTALIS AMERICANA.

Robina Silsbee Smith.

(Plate 34.)

Those acquainted with the Trientalis and with its life under ground are familiar with its slender white tuberiferous runners one or two feet in length. It is of great interest in the dry days of late summer to lift off the deep covering of moss and disclose this outcome of the summer's work with the well-developed tuber (fig. 3, f) already rooted in the ground. The protective bend of the bud is especially marked and at intervals along the runners are minute scales (fig. 3, e) similar in nature to those more developed on the upright stem (fig. 1, b). As the white runners thread the moss a touch of rose-color here and there shows where they have run nearer to the surface and felt the influence of the sun. These traces of color suggest in a novel way the stem-nature of the underground runners.

Some years ago, in late summer, at Machias, Washington Co., Maine, a few peculiar specimens of the Trientalis were found. From the axils of the leaf-like scales (fig. 2, g fig. 1, h) were produced slender aërial runners (fig. 2, c). They were of a deep carmine color, and an unusual coloring of the leaves suggested some injury or blight. These plants showed no sign of blossoms except in cases where blossoms had not perfected fruit (fig. 2, d). These aërial runners, as they dip into the moss, form tubers similar to the

usual subterranean ones. Ordinary plants of Trientalis at this season show very long underground runners and well developed tubers (fig. 3, f) but these plants for some reason seem to have put their strength into these runners above ground and the growth beneath the moss is such as in fig. 1, a.

These odd plants grew at the base of an evergreen covered ledge, on the north side, on the outskirts of a sphagnum swamp and amid a growth favoring sedges, Nabulus, flag and creeping snowberry.

They have continued to hold their own in that one spot, changing only from the mossy base of one tree to that of another. This place is just on the border line where the "old growth" type of vegetation meets the tangle of a sunny second-growth.

I have been constantly on the watch for another locality where Trientalis could be found growing thus, and two or three years ago found a couple of similar plants on the north slope of an adjacent ledge where a tangle of raspberry and Aralia was covering the demolition of the old growth. I have never seen them any where else.

Sometimes the graceful runners are swinging free, sometimes they have just penetrated the moss enough for the tuber to form (fig. 1, j). Last summer (1900) after the extreme drought I was unable to find a specimen in the old place for a long time, but one plant finally appeared with a well developed tuber and the same characteristics as in previous years.

Fig. 4 is a portion of an aërial runner where branch-runners appear to be starting.

I was once attracted to what appeared to be a similar condition of growth in Trientalis but it proved to be another interesting phase of life. A couple of these plants were growing on the moss covering of an old fence log. When the white underground runners reached the perpendicular end of the log and lost the covering of moss, they assumed the rich color of the aërial runners and swung out free over the edge instead of following out the root instinct and seeking the dark again. Here again the pink spots on the white runners showed at intervals the effect of the light.

Cambridge, Massachusetts.

FURTHER NOTES ON RHADINOCLADIA.

R. E. Schuh.

In Rhodora, Vol. II, pp. 111 and 112 (June, 1900), appeared a description of *Rhadinocladia*, a new genus of brown algae. Because of the scarcity of specimens no formal attempt was made to present all its generic characters. The discovery of additional material, including at least one undescribed species, makes an effort in this direction seem more promising at the present time.

Rhadinocladia, Schuh.

Small plants, often growing in loose tufts. Basal layer several cells in thickness except near the edges, adhering closely to the substratum and originating one to eight branching fronds, which possess a well-defined central axis one or more cells in width. Axis bearing numerous long and slender branches, with many or few ramuli and occasional hairs. Plurilocular sporangia cylindrical or oblong, sessile, abundant and entirely superficial. A variable genus allied to *Desmotrichum*.

1. R. Farlowii Schuh (l. c.) Basal layer mostly producing but one plant. Central axis apparent, usually of several series of cells except at the narrower base; branches given off at acute angles, long and flagellate, cells mostly uniseriate, ramuli few and rather short. About 16 mm. high. Fruit bluntish, elliptical-oblong, scattered, 20–25 μ wide, 70–85 μ long.

In summer on *Chorda* in Vineyard Sound, Massachusetts and on *Zostera* in Narragansett Bay, Bristol, Rhode Island.

2. R. **cylindrica**, n. sp. Axis usually monosiphonous occasionally with binate cells, with slender divaricate branches bearing numerous patent ramuli. About 3–8 mm. high, ordinarily producing several thalli from the same basal layer. Plurilocular sporangia very densely clustered along the axis and branches, their bases much compressed by crowding, very long cylindrical, with rounded tip. Size 60–80 × 15–18 μ.

Always on *Zostera*, in midsummer and autumn, in Bristol Harbor, Rhode Island.

South Braintree, Massachusetts.

THE HERBARIA OF NEW ENGLAND.

Mary A. Day.

(Continued from page 208).

Collins, James Franklin, Providence, Rhode Island. — Mr. Collins' herbarium, which is chiefly local, was commenced in 1884 and contains about 4700 mounted specimens, including nearly 2000 species of the flowering plants and ferns, and 1600 mosses; also about 2300 unmounted and mostly unnamed mosses.

Conant, Woodbury P., Salem, Massachusetts. — The collection of Mr. Conant contains the *Cyperaceae*, *Gramineae*, and *Filices* of North America, and the *Juncaceae* of New England. Mr. Conant has made a specialty of the *Cyperaceae* and *Gramineae* and has most of the North American species of these groups.

Connecticut Agricultural Experiment Station, New Haven, Connecticut. — Mr. Oscar D. Allen, formerly an instructor at Yale University laid the foundation for this collection, which was continued and enlarged by his son, John Alpheus Allen, who sold his private herbarium to the Station in 1885. This consisted of his collections in Connecticut, Maine, and southern Labrador. The herbarium now numbers about 5000 specimens, and is specially rich in *Saxifraga* and *Salix*, including 69 species and varieties of the latter from the herbarium of Michael Schuck Bebb, the well-known Salicologist; also in *Cyperaceae* from all parts of the world. The Station also possesses a small mycological collection and many of the principal sets of fungi. The herbarium is in charge of Dr. W. C. Sturgis.

Cummings, Clara Emma, Wellesley, Massachusetts. — The herbarium of Miss Cummings consists of about 4000 specimens of lichens and including Decades of North American Lichens distributed by C. E. Cummings, T. A. Williams, and A. B. Seymour; also Lichenes Boreali-Americani, some specimens from Calkins, some from Arnold, and the set from the Harriman Alaskan Expedition. Miss Cummings has sold her collection of mosses to Dr. G. G. Kennedy.

Cutler, Manasseh. — Rev. Manasseh Cutler, the earliest New England writer upon systematic botany, had a large collection of plants both from New England and Ohio, but these were all destroyed by fire.

Dame, Lorin Low, Medford, Massachusetts.— Mr. Dames' collection is specially devoted to the trees of New England; he also has most of the shrubs. His herbarium contains many specimens of the same species showing variations.

Dartmouth College, Hanover, New Hampshire.— This herbarium contains 40000 sheets of phaenogams, foreign species as well as American being represented. It is specially strong in tropical ferns but weak in local flora. It includes the herbaria of Professors Charles Henry Hitchcock and Henry Griswold Jesup. The latter of 3000 or 4000 sheets contains many of Lesquereux' mosses, of Sullivant's hepatics, and of Tuckerman's lichens. The herbarium is in charge of Mr. George R. Lyman.

Davenport, George Edward, Medford, Massachusetts.— In 1875 Mr. Davenport gave his herbarium then containing 116 species of ferns to the Massachusetts Horticultural Society of Boston. In May, 1900, it comprised about 700 sheets containing nearly 3200 specimens representing all genera and species of American pteridophyta north of Mexico. It is especially rich in *Cheilanthes* and *Botrychium* — the *ternatum* group of the latter genus alone being represented by some 200 specimens.

Deane, Walter, Cambridge, Massachusetts. — Mr. Deane's herbarium was started in 1880 and now contains over 36000 sheets. The geographical limit is that of Gray's Manual and the botanical limit the phaenogams and vascular cryptogams. In its early years many American plants outside the Manual region were included but none are incorporated now, also probably one thousand European specimens many of which are plants which have been introduced into America. Many specialists have worked over the plants of their own groups; the 2800 sheets of *Carex*, coming from all parts of North America, having been examined by Professor L. H. Bailey; the *Junci* by Dr. George Engelmann; the genus *Salix* by Mr. M. S. Bebb; the *Umbelliferae* by Drs. Coulter & Rose; the genus *Vitis* by Professor L. H. Bailey; and many miscellaneous plants have been determined by Dr. Gray and Dr. Watson. The Potamogetons, about 700 specimens also from all parts of North America, are unmounted in order to show venation, and until his death were all determined by Dr. Morong who contributed duplicates of nearly all his own material to Mr. Deane's herbarium. Many of the grasses have been examined by Messrs.

Vasey and Scribner. In some genera Mr. Deane has made dissections of the flowers and mounted the parts, either in pockets or on the sheets with the specimens. The genus *Pontederia* is represented in all its forms from the very young stage to late fruiting.

Dewey, Chester. — The Carices belonging to Dr. Dewey and forming his working collection, are now at Bates College, Lewiston, Maine, having been included in President Chadbourne's herbarium, which was purchased for this college.

Eames, Edwin H., Bridgeport, Connecticut. — Dr. Eames has accumulated, during the last eleven years, by collecting and exchange work, an herbarium of about 8500 specimens of phaenogams and vascular cryptogams, including about 4200 species. The area represented is eastern North America, including those states crossed by the 100th meridian.

Eaton, Alvah A., Seabrook, New Hampshire. — Mr. Eaton's herbarium, containing about 2800 specimens (of which 2600 are from the United States and 200 from Europe) consists of phaenogams and vascular cryptogams. The pteridophyta of the United States are well represented, especially the genera *Equisetum* and *Isoëtes*.

Eaton, Daniel Cady, see Yale University.

Eggleston, Willard Webster, Rutland, Vermont. — In 1886, while a student at Dartmouth College, Mr. Eggleston commenced his herbarium. It now contains about 25000 specimens, including some 5000 species. It was commenced with the idea of representing the flora of the region covered by Gray's Manual, but has extended west and south over the United States. It is specially rich in New England plants, Vermont and the White Mountains having the best representation. Mr. Eggleston has attempted to show geographical distribution and many of rarer plants are represented from several stations. Among the New England plants which have been collected in the largest numbers are the *Gramineae*, the genera *Astragalus*, *Crataegus*, *Amelanchier*, *Rubus*, *Aster*, *Solidago*, *Carex*, *Pycnanthemum*, *Scirpus*, *Eleocharis*, and *Potamogeton*. This herbarium contains much of the material upon which the recently published Flora of Vermont, by Messrs. Brainerd, Jones and Eggleston was based.

Essex County Natural History Society, see Peabody Academy of Science.

Essex Institute, see Peabody Academy of Science.

Fairbanks museum of Natural Science, St. Johnsbury, Vermont. — The nucleus of this herbarium was the collection of plants of Dr. A. Blanchard, of Peacham, Vermont, numbering about 2500 sheets, which was purchased in 1889 and placed in the museum building when it was built in 1891. Since then it has been increased by collections of some of the Vermont botanists and now contains about 5100 sheets of phaenogams and cryptogams from both Europe and America.

Faxon, Charles Edward, Jamaica Plain, Massachusetts. — This herbarium, accumulated by Mr. Faxon and his brother, the late Edwin Faxon, consists almost entirely of New England plants, and contains about 4000 species, and at least 5000 sheets, representing all groups except fungi. It is mounted in folios. Among the specialists who have critically examined and named many of the plants, were Dr. Asa Gray, Mr. M. S. Bebb, and Dr. Geo. Engelmann. In 1898 Mr. Faxon presented to the Gray Herbarium more than eleven thousand duplicates collected by his brother and himself. Of these the bryophytes and thallophytes have since been deposited in the Cryptogamic Herbarium of Harvard University.

Fernald, Merritt Lyndon, Cambridge, Massachusetts.— Mr. Fernald began his collection in 1887, and it now numbers not less than 20000 sheets, which are mostly unmounted. The plants, chiefly phaenogams and vascular cryptogams, are arranged in systematic order and are strictly confined to the flora of Maine. The localities chiefly represented are Aroostook, Penobscot, Piscataquis, and York Counties, with portions of Somerset, Lincoln, Hancock and Franklin Counties. This is the most complete representation in existence of the vascular plants of Maine.

(*To be continued.*)

Vol. 3, No. 31, including pages 191 to 208 and plate 33, was issued 12 July, 1901.

R. S. Smith del.

AËRIAL RUNNERS IN TRIENTALIS AMERICANA.

Rhodora

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MISCELLANEOUS NOTES ON NEW ENGLAND FERNS AND ALLIES.

George Edward Davenport.

During the preparation of the series of Notes here proposed it is the author's intention to jot down from time to time such observations on the character, habits, and habitats of our New England Pteridophytes as may appear to be worthy of special record, and incidentally to ascertain and establish the range of the different species throughout the New England States; also to secure specimens for verification from as many localities as possible to deposit in the Herbarium of the New England Botanical Club as a part of the work on its proposed revision of the New England Flora.

To this end the co-operation of New England fern students is requested, and specimens — especially of unusual forms — with such data as may be necessary for accurate descriptions of plants, and habitats, solicited.

Full credit will be given for all assistance rendered, and the author will gladly reciprocate in every way that he can. Special sendings for identification will be returned to sender on request provided stamps are furnished for return postage, and all specimens may be sent direct to author's address, 67 Fellsway West, Medford, Mass.

1. Development of the Sporophyll in Osmunda and Struthiopteris. — It is very commonly believed that the fertile fronds, the sporophylls, in Osmunda are developed from the centre of the crown, and are surrounded by a circle of sterile fronds, yet careful observation shows that this is an error due to a false appearance of the plant at maturity, and a superficial examination.

Nearly all writers who have mentioned the matter at all have de-

scribed the fertile fronds of *Osmunda cinnamomea* as arising from the centre of a crown the sterile fronds of which surround the fertile in the form of a vase, and Mr. Clute, in his recent very beautiful fern book, has been the first to describe accurately the fact that the fertile fronds arise from the outside part of the series, and that the appearance of the mature plant is due to the angle of ascension through which the growing fronds reverse their natural order.

It is possible, however to infer from Mr. Clute's description that the outer series is wholly composed of fertile, and the inner series of sterile fronds, but this is only partially correct, as, while the fertile fronds always arise from the outside, only a part of the outer series of crosiers develops sporophylls the number varying with the size of the plant; so that the outer series is most accurately described as consisting of both fertile and sterile fronds, while the inner series is always composed of sterile fronds.

Perhaps this may be a little more clearly stated by saying that in the development of the growing plant from the crosiers the sterile fronds lean out at an angle that gradually brings the more erect fertile fronds within the radius of the whole series and thus gives to the mature plant the appearance which has been responsible for a popular error.

This is equally true of the other species of *Osmunda*, both *O. Claytoniana*, and *O. regalis* developing their fertile fronds from the outer row of crosiers, while in *Struthiopteris Germanica* exactly the converse is true the fertile fronds being evolved from within the centre of the vase-like series of sterile fronds.

2. New Stations for Asplenium ebeneum, Aiton, var. Hortonae, Davenport. — This very lovely fern which was described in Rhodora for January (1901) as a "plumose" variety of the ebony spleenwort from Vermont, appears to have been found as long ago as 1894, by Prof. C. E. Waters at a station on the Gunpowder river near Baltimore, Maryland. Prof. Waters at the time noticed the peculiar cutting of the frond, and made a blue print impression which is now in my possession, and which shows clearly enough the identity of his plant. Recently he has written me that he has seen a single frond of the variety in the Herbarium at Mt. Holyoke without data, but this I cannot personally vouch for.

Another specimen which, through the courtesy of Mrs. Horton, I have seen, was collected by Mr. J. H. Ferriss on Carrion Crow Mt.,

Arkansas, in March (1901). This specimen appears to be much less cut than a careful examination shows it really to be, the deep oblique incisions being very fine and close, but I have not hesitated to refer it to the variety as all of its other characters are those of var. *Hortonae.*

There is really nothing surprising in the finding of this form at stations so far apart, as, given plenty of *A. ebeneum*, and spore dissemination for factors, there is no reason why similar variations should not follow spore germination wherever the species abounds.

It is not to be expected that in all cases the result should be mechanically identical, as if made by dyes, but considerable divergence is to be looked for. In my own plants, now under cultivation, some of the fronds are beautifully frilled, and feather like in appearance, the incisions being very deep, with the oblique lobes crowded closely together and overlapping one another in a more or less imbricated manner, while the rachises are somewhat flexuose and the lamina gracefully curved.

In some more highly developed fronds from Mrs. Horton the incisions are more open, and some of the pinnae are conspicuously pinnatifid to the centre with the lobes strongly incised, and the halbert-shaped basal ones broadly and deeply pinnatifid, so that the frond is bipinnatifid.

Mrs. Horton notices that in the taller fronds the stalks just above the base are exceedingly brittle, and break off easily much after the manner of the Woodsias.

So far this variety has shown no signs of fruiting and is to be regarded as a sterile form, bearing a somewhat similar relation to the normal form of the species as var. *cambricum* does to *Polypodium vulgare.*

MEDFORD, MASSACHUSETTS.

BOLETI COLLECTED AT ALSTEAD, NEW HAMPSHIRE,— ADDITIONAL NOTES.

H. Webster.

As no small part of the interest and profit of studying the fleshy fungi in the field is connected with observing the recurrence or the non-appearance of the fruiting stage in succeeding years, it may be worth while to compare the list of Boleti seen at Alstead, New Hampshire, a year ago[1] with this year's list. Whether owing to greater rainfall, greater heat, or to some less obvious difference in the conditions, the Boletus season was a week or ten days earlier, apparently, than in 1900. On the other hand, in general, Boleti did not fruit so freely, in spite of a rather marked increase in the abundance of a few kinds such as *B. felleus* and *B. bicolor.* By the first of August, all the species collected a yeai ago had again been seen, and a few days later, when collecting ceased, a glance at the list showed several kinds not seen last year, as well as one or two seen too late to be noted at the time.

Noteworthy for its plentifulness in certain localities, usually hemlock or mixed woods, was *B. albus* Peck. Closer acquaintance with this species brings out its individuality, more strikingly, as well as deepening the conviction that somehow it must be *B. granulatus* in disguise. Its proportions are, on the whole, constantly different, taking the average of many collections. It has longer stems, with smaller caps, than its close relative. Moreover, the color of the granules that stud the white stems is darker, with a purplish, or pale inky tint, foreign to *B. granulatus.* Both species in the young button stage are often covered underneath with drops of moisture, in which some of the coloring matter seems to be suspended.

Boletus piperatus was conspicuous by its rarity. Usually the roadsides and certain spots in deciduous woods are dotted with it. *B. subglabripes*, also, surprisingly plentiful last year, was comparatively scarce. On the other hand *B. bicolor* was frequently found, perhaps in places overlooked in previous years. It is certainly very constant to locality. *B. chrysenteron*, too, was this year familiar in the collecting baskets — not only in the typical form, but also in the dimin-

[1] See Rhodora 2: 20. August, 1900, p. 173.

utive, rose-pink state which seems invariable enough for varietal distinction at least, and is possibly the form that Massee considers equivalent to *B. versicolor* Rost.

B. pachypus was found so often as to seem common. In appearance it agreed well with Fries's plate [Ätl. och Gift. Sv. Pl. LXVIII], though more subdued in tint, as might be expected. No specimens were found with swollen stems. A disagreeable bitterish taste was always present. The spores, as in Gillet's figure, are of the usual Boletus type. Of *B. griseus* several collections were made, looking, as usual, much like bleached and darkened *B. ornatipes*, but almost invariably much heavier, and with much thicker stems. The specimens with yellowish stems are especially calculated to raise doubts.

B. affinis Peck was very abundant in mixed woods. It varied much in the intensity of the brown of the cap, and passed easily into the var. *maculosus* Peck with spotted top. The dark ferruginous stains of the bruised pores, and the bright ochraceous color of the old pore surface were very constant. Some specimens showed the upturned margins and convex tube surface noted by Mr. Peck.

B. luridus was extraordinarily abundant. Occasionally it had the dark intense colors of the descriptions and plates, but was usually paler, and soon faded to dingy orange. Few colors are more striking among fungi, than the rich red or purple of the young pore surface of this Boletus.

B. gracilis Peck was occasional. It is like a slender delicate form of *B. scaber* with pores the color of those of mature *B. felleus*. It was found here and there one, always unexpectedly.

Of species unrecorded last year, the most interesting for its beauty and apparent rarity is *Boletus Ravenelii*. This was found first late in July, growing sparingly among ferns on the raised border of a sphagnum bog in Langdon, a little north of the Cheshire county line. A few days later another collection was made on a rocky hillside in mixed woods in Alstead. The fruits in both cases were not fully developed, but all the more beautiful for that reason, for the veils were unbroken. The bright sulphur yellow of the buttons makes them striking objects, especially in a green setting. Of somewhat less interest is *B. variipes* Peck. A small collection of this, part of which was seen by Mr. Peck, was made in 1900 and more was found this year. It is not a striking species. Another addition to the list is *Strobilomyces strobilaceus*, which was found too late

for mention last year. This year it was conspicuous in early August in various places.

The thirty-three species of Boleti so far seen at Alstead, besides a few forms not yet satisfactorily placed, are to be found fruiting almost at the same time. In fact, a year ago, twenty-five species were assembled in one day's collecting. As the localities where each kind may be expected with certainty become better known, it may well be possible in a good season to bring all the July and August species together in a fresh state.

NEW STATIONS FOR JUNCUS SUBTILIS.

M. L. Fernald.

In September, 1897, a very slender strongly proliferous *Juncus* was found in abundance in shallow water of Mattawamkeag Lake, Aroostook County, Maine. Except for its nodulose leaves and crimson color the plant resembled the well-known floating state of *Eleocharis acicularis*; and as is usually the case with the submersed *Eleocharis* the *Juncus* was entirely sterile. Subsequently the plant was collected in pools by the St. John River at Van Buren, but at this station only sterile specimens were seen.

On the tenth of August last (1901) the same slender floating form of the plant was found in a quiet pool or "bogan" of the St. John River at Fort Kent, Maine. All the submersed plants were sterile, but those which had become stranded upon the muddy shore showed a tendency to flower. These stranded individuals were strongly repent; and they so closely resembled the matted plants of *Ranunculus Flammula*, var. *reptans*, with which they grew, that only the most back-breaking and eye-straining scrutiny would reveal them. The combined search of Mr. E. F. Williams, Dr. B. L. Robinson and the writer during a large part of the afternoon and much of the next forenoon was rewarded by perhaps sixty fertile plants. Of these, however, only a small proportion were yet in flower, and none were in fruit.

A comparison of the flowering material collected at Fort Kent shows it to be identical with the plant found in 1871 by the late Charles E. Smith at the margin of Brassua Lake, Somerset County,

Maine. Mr. Smith's plant has been referred to *Juncus subtilis*, E. Meyer, although by recent authors that obscure species has been treated merely as an aquatic variety of *J. pelocarpus*.

According to Meyer, his plant, collected by Bosc "in uliginosis et rivulis Canadae," was the same as that referred by Michaux to Lamarck's *Juncus fluitans*. The brief description given by Meyer, "Caule radicante foliisque capillaceis, floribus subbinis, perianthii laciniis obtusis, interioribus longioribus, (staminibus tribus?)," agrees with the capillary plant found at various points in northern Maine, except that in the Fort Kent material there are usually 6 (rarely 4) stamens. Engelmann's description of *J. pelocarpus*, var. *subtilis*, drawn from Michaux's *J. fluitans* (collected at Chicoutimi, Quebec), "caule reptante vel fluitante radicante folioso: foliis brevibus setaceis ex axillis proliferis; floribus subbinis 3-andris," agrees with the Maine plant quite as well as does Meyer's characterization.

Juncus subtilis has been very little known since its original description by Michaux (as *J. fluitans*) and by Meyer. In American herbaria it has been known only recently, from Mr. Smith's Brassua Lake material, in most of which the stamens are badly shrivelled or wanting. Owing to this insufficient knowledge of the flower the plant has long been treated as a floating state of *J. pelocarpus*. When Dr. Engelmann first suggested this disposition of the delicate plant it was with hesitation, for the species was then unknown to American botanists and his only acquaintance with it was from Laharpe's notes on the Michaux material.

At Mattawamkeag Lake and at Fort Kent where *Juncus pelocarpus* is abundant both on the shores and in shallow water no tendency to intergrade with *J. subtilis* has been noted. *J. pelocarpus* in water, as well as on shores, is an erect plant with definite caudex, with usually two or three ascending long leaves, and with a well developed dichotomous panicle. The flowers are often modified into tufts of small leaves, but this proliferous tendency is strictly confined to the inflorescence. In perfect flowers the sepals (or at least the alternate ones) are acuminate, and the anthers are distinctly longer than the filaments. *J. subtilis*, on the other hand, is a capillary repent plant, in water often becoming 2 dm. long. The roots are slender and fibrous but no definite caudex is apparent. The setaceous basal leaves are very numerous and elongated, while the axils of most of

the cauline bear fascicles of shorter leaves. The flowers are solitary or few (mostly in pairs) on short lateral or terminal branches; the sepals are obtuse; and the anthers are distinctly shorter than the filaments. With such marked vegetative and floral characters *J. subtilis* seems clearly distinct from *J. pelocarpus* with which it has recently been associated.

Its bibliography and stations are:

Juncus subtilis, E. Meyer, Syn. Luz. 31; Laharpe, Mon. 135. *J. fluitans*, Michaux, Fl. i. 191, not Lam. *J. verticillatus*, Pursh, Fl. i. 237, in part, not Pers. *J. uliginosus*, var. *subtilis*, Hook. Fl. Bor.-Am. ii. 191. *J. pelocarpus*, var. *subtilis*, Engelm. Trans. St. Louis Acad. ii. 456; Gray, Man. Ed. 5, 541; Coville in Britton & Brown, Ill. Fl. i. 390. *J. pelocarpus*, var. *fluitans*, Buchenau, Mon. 283. — Quebec, Chicoutimi (*F. A. Michaux*, according to Prof. Ovide Brunet): Canada, without station (*Bosc*, according to Meyer): Newfoundland, mud near Bay St. George, Aug. 25, 1897 (*A. C. Waghorne*): Maine, margin of Brassua Lake, Somerset County, 1871 (*Chas. E. Smith*); Mattawamkeag Lake, Sept. 7, 1897, and margin of St. John River, Van Buren, Sept. 18, 1900 (*M. L. Fernald*); margin of St. John River, Fort Kent, Aug. 10, 1901 (*E. F. Williams, B. L. Robinson*, & *M. L. Fernald*).

Juncus fluitans, Lam., for which Michaux mistook his Chicoutimi plant is a form of *J. bulbosus*, L. (*J. supinus*, Moench) and is to be expected in northern New England and adjacent Canada. This plant, which has been collected in Newfoundland by Robinson and von Schrenk, differs from *J. subtilis* in its coarser habit, usually bulbous-thickened base, several-flowered heads and more pointed sepals.

Gray Herbarium.

LATHYRUS TUBEROSUS IN VERMONT.

L. R. Jones.

Specimens of an unusual and very pretty sweet pea, *Lathyrus tuberosus*, L., were recently sent to me from Vergennes, Vermont, by Miss Ruth Fisher. This species is a native of Asia and eastern Europe. It occurs also at a single station in England according to

Hooker, but so far as I can learn it has not heretofore been reported from America. This seems strange for the flowers are almost equal in color and fragrance to those of the common sweet pea although only two-thirds as large. *L. tuberosus* is a perennial with creeping root-stocks bearing numerous tubers or tuberous roots. These have an agreeable flavor, suggestive of green peas, and are reputed edible. It is not only perfectly hardy in Vermont but is abundantly able to persist as a weed. Miss Fisher has watched its development and spread in a moist meadow during some ten years. At first only a few plants occurred, but now it is scattered over a number of acres and for a distance of forty rods. The land has been under cultivation with corn and potato crops during a part of this period and the persistent spreading of the species under these conditions has finally alarmed the owner of the field. It forms dense circular patches resembling *Vicia Cracca* in habit and like that species it smothers the grasses and clovers in the area where it occurs.

Its mode of introduction is a mystery. The location precludes the idea that it is a garden escape. Some horses were brought to this farm from France fifteen or more years ago and possibly it was introduced at that time. I recently showed the plant to Mr. F. H. Horsford of Charlotte and he at once recognized it as the same plant that seedsmen have sent to him under the name *Lathyrus rotundifolius*. The identification of the plant as *L. tuberosus* has, however, been confirmed at the National Herbarium. Mr. Horsford has had the plant in his nursery at Charlotte for some time but he has recently omitted it from his catalogues partly because he considered it too likely to become a weed pest. I am confident that the plant is in Vermont to stay unless unusual efforts are made to eradicate it. Since it has been distributed somewhat by seedsmen it probably occurs in other places in this country as a garden escape.

University of Vermont.

NOTES ON SOME TREES AND SHRUBS OF WESTERN CHESHIRE COUNTY, NEW HAMPSHIRE.

M. L. Fernald.

The past three summers have afforded an opportunity to study the vegetation of a portion of southwestern New Hampshire drained by the Connecticut River and its tributaries, the Ashuelot and the Cold Rivers. The principal observations have been made in the course of short walking or longer driving excursions within a radius of about ten miles from Alstead Centre. Here have been noted very many species quite unfamiliar to one whose knowledge of the New Hampshire flora is confined to the White Mountains, the dry upland of eastern Cheshire County, or the coastal area. The forests of western Cheshire County are essentially deciduous, though occasional spruce or fir swamps occur and white and pitch pine are found in their proper habitats. In the main, however, the forests are composed of southern rather than northern trees; and several species which rarely reach eastern or central New Hampshire are here conspicuous elements in the landscape.

In the following notes are recorded such trees and shrubs of this region as seem to the writer of sufficiently restricted range in New England to be of special interest. Note is also made of a few species generally common throughout eastern New England but apparently wanting or very rare in the southwestern corner of New Hampshire.

Pinus resinosa, Ait. Very rare and scattered.

P. rigida, Mill. Abundant on the Drewsville sand-plain and on the lower slopes of Fall Mt., Walpole. Scattered individuals reach an altitude of 340 m. (1100 ft.) at Alstead Centre.

Larix americana, Michx. Only cultivated specimens noted in the region.

Picea rubra, Link. The only spruce seen. Scattered in upland woods and occasionally forming forests.

Abies balsamea, Mill. Often planted, but native only in upland woods and swamps at about 460 m. (1500 ft.) alt., near Gustin Pond, Marlow.

Thuja occidentalis, L. Only cultivated specimens seen.

Juniperus communis, L., var. *canadensis*, Loud. Very rare. One small station noted on a hillside near Keene.

J. virginiana, L. Dwarf trees at scattered stations in Alstead.

Juglans cinerea, L. Very common in rich soil.

Carya amara, Nutt. Frequent, especially by streams.

C. alba, Nutt. Frequent in upland woods; ascending to 370 m. (1200 ft.) at Alstead Centre.

Populus balsamifera, L., var. *candicans*, Gray. One of the commonest and stateliest trees in the alluvium of the Connecticut and the Cold River. With Negundo, River Maple, and White and Slippery Elm, forming a tall and dense forest along the Connecticut at the foot of Fall Mt., and opposite Bellow's Falls. The densely pubescent petioles and the ciliate margins of the broad-cordate leaves at once distinguish this tree from the usually smaller but more common *P. balsamifera*.

Salix longifolia, Muhl. Small shrubs by the Connecticut, below Fall Mt., Walpole.

Betula populifolia, Marsh. Rare: occasional scattered trees in dry soil.

Castanea sativa, Mill., var. *americana*, Gray. Frequent, especially in upland woods.

Quercus rubra, L. The common oak of the upland woods.

Q. velutina, Lam. (*Q. tinctoria*, Bartram). Frequent in sandy soil, Drewsville.

Q. ilicifolia, Wang. Common on the Drewsville sand-plain and at the base of Fall Mt., Walpole.

Q. alba, L. The common oak of the sand-plains and of dry woods, especially below 250 m. (800 ft.) altitude.

Q. prinoides, Willd. Fruiting shrubs 1 m. high abundant on the crest of Fall Mt., Walpole.

Ulmus fulva, Michx. Scattered trees with the more abundant *U. americana* in alluvium of the Connecticut River.

Sassafras officinale, Nees. Small trees on the eastern slope of Fall Mt., Walpole.

Ribes Cynosbati, L. Very abundant in damp gravelly or rocky soil.

R. oxyacanthoides, L. The smooth-fruited gooseberry so common throughout eastern New England has been searched for in vain, and it appears to be quite unknown to the people of the region.

Platanus occidentalis, L. Frequent by streams.

Rubus neglectus, Peck. Frequent in damp thickets, Alstead and Walpole. Resembling *R. occidentalis*, but with purplish-red raspberry-like fruit.

R. nigrobaccus, Bailey, var. **calycosus.** Calyx composed of veiny laciniate or toothed leaf-like sepals 2 to 6 cm. long: lower pedicels usually elongated: fruit 0.5 to 1 cm. long, dry. Covering several square rods in a dry thicket, Alstead Centre, Aug. 7, 1899 (*M. L. Fernald* in Herb. Alstead School Nat. Hist., no. 21); July 28, 1901 (*E. F. Williams*). First called to the writer's attention by Miss Alice Mallonee. Apparently identical specimens are in the Gray Herbarium from Caldwell, New Jersey, 1879 (*M. S. Crane*), and from Wyathville, Virginia (*H. Shriver*).

Rosa blanda, Ait. Rare in alluvium by the Connecticut, Westmoreland.

R. carolina, L. Infrequent, margin of Warren Pond, Alstead.

R. humilis, Marsh. Abundant on the Drewsville sand-plain and on the west slope of Fall Mt., Walpole.

R. lucida, Ehrh. This, the common rose of eastern New England, is apparently unknown in southwestern New Hampshire. Only one station, in the Hoosac valley, is recorded in Vermont.

R. nitida, Willd. This species, as yet unrecorded in Vermont, has been noted about various ponds and in boggy meadows in Alstead and Marlow, only a few miles from the Vermont border.

Prunus americana, Marsh. One clump of small trees in a thicket at Alstead Centre has the characteristic spherical fruit of this species. *P. nigra*, Ait., with oblong laterally flattened fruit is abundant.

P. insititia, L. Well established in a roadside thicket, Surry.

P. pumila, L. Very abundant in sand and gravel by the Connecticut. The fruit, mature in late July, has been used successfully in making a rich dark jelly.

Xanthoxylum americanum, Mill. Locally abundant on the gravelly slope of Surry Mt., Surry: also at scattered stations in Alstead.

Rhus copallina, L. Common in dry soil in the Connecticut valley; ascending to 280 m. (900 ft.) near Alstead Centre.

R. glabra, L. Drewsville sand-plain and slopes of Fall Mt., Walpole.

Acer saccharum Marsh., var. *barbatum*, Trelease. Characteristic trees with small firm dark green three-lobed leaves appear very distinct, but many transitions are noted between this and the typical *A. saccharum*.

A. saccharum, var. *nigrum*, Britton. Occasional in alluvium of

the Cold River. The large dark green "flabby" leaves with closed sinuses and with densely pubescent petioles and lower surfaces quickly distinguish this tree from the ordinary forms of the sugar maple.

A. saccharinum, L. (*A. dasycarpum*, Ehrh.). The common maple of alluvium by the Connecticut and the lower Cold River.

A. Negundo, L. Frequent in alluvium by the Connecticut.

Ceanothus americanus, L. Abundant on dry banks of the Connecticut, on Fall Mt. and the Drewsville sand-plain.

Vitis Labrusca, L. Occasional on dry banks.

V. aestivalis, Michx. Rocky slope of Fall Mt., Walpole.

V. vulpina, L. (*V. riparia*, Michx.) Abundant by rivers. Climbing high (often forty feet) and forming dense arbors by the Connecticut.

Dirca palustris, L. Very local: one small bush in rich woods below Alstead Village.

Nyssa sylvatica, Marsh. Small fruiting trees in gravel by the Connecticut, base of Fall Mt., Walpole.

Rhododendron canescens, Don. Common on Fall Mt., and on gravelly banks of the Connecticut.

R. Rhodora, Don. Apparently rare or unknown in the region, although abundant on Mt. Monadnock a few miles distant.

Kalmia latifolia, L. Forming an extensive thicket by the Ashuelot River, Gilsum.

Andromeda ligustrina, Muhl. Frequent in damp gravelly soil below 308 m. (1000 ft.) altitude.

Gaylussacia resinosa, Torr. & Gray, var. *glaucocarpa*, Robinson. With the species, gravelly banks of the Connecticut, Walpole.

Vaccinium corymbosum, L., var. *atrococcum*, Gray. Abundant with the species, Warren Pond, Alstead.

V. vacillans, Kalm. Abundant in dry soil, Drewsville sand-plain, slopes of Fall Mt., and other sections of Walpole.

Fraxinus pennsylvanica, Marsh. (*F. pubescens*, Lam.). Gravelly shore of the Connecticut, Walpole.

F. pennsylvanica, var. *lanceolata*, Sargent (*F. viridis*, Michx.). With the species.

F. nigra, Marsh. Valley of the Cold River, Alstead and Marlow. Rare below 400 m. (1300 ft.) altitude.

Lonicera dioica, L. (*L. glauca*, Hill). Frequent either as a climbing

vine or a sprawling shrub, Drewsville sand-plain, Fall Mt., and at other sections of Walpole.

Alstead School of Natural History, Alstead, New Hampshire.

NOTES ON THE FERNS OF MARANOCOOK, MAINE.

Haven Metcalf.

I find upon consulting my notes and herbarium, made during some years of residence in Winthrop, Maine, that I can supplement Mr. Davenport's list in Rhodora, i. 218, as follows. All the plants named, except where noted, grow within two miles of the Maranocook station.

Aspidium fragrans Swartz. Scarce; along a brook on the east shore opposite Craig's Point. Also on the northern slope of Mt. Pisgah, five miles southwest of Maranocook.

Aspidium Goldianum Hook. Fairly common in woods on north and east shore of the lake.

Asplenium ebeneum Ait. In one locality, near Kent's Hill.

Asplenium thelypteroides Michx. In several localities near the shores of Lake Anabescook.

Asplenium Trichomanes L. Along the steep banks of a gully, toward Kent's Hill.

Camptosorus rhizophyllus Link. In one locality only, growing over a ledge, near Kent's Hill. When I last visited the place, in 1894, the plants were being decimated by local amateur collectors.

Cystopteris fragilis Bernh. Common in upland woods throughout the region.

Polypodium vulgare L. Common; hills west of the lake.

Woodsia ilvensis R. Brown. Fairly common along high land east of lake, about ledges.

Woodsia obtusa Torr. Several localities about Mt. Pisgah.

Woodwardia virginica Smith. Abundant in the swamp along the Readfield shore, also in the swamps east of Mt. Pisgah.

Twelve years ago *Adiantum pedatum* was very common all about this region; but the plant has been so much sought after by summer visitors that it is practically extinct in all accessible localities. It is

still abundant along the borders of the deep swamps east of Maranocook.

Mr. Davenport's paper and this give some idea how rich the region is in ferns. I might mention further, that *Isoëtes* is common about the shores; and in a brook running into the arm of the lake east of the Maranocook station *Marsilia quadrifolia* can be found. I have an idea that the latter is a newcomer, as I never saw it in this place until 1896, and it has become more abundant each year since. I wish that members of the New England Botanical Club might be induced to botanize further about Lake Maranocook.

Tabor College, Tabor, Iowa.

Habenaria Hookeriana oblongifolia in West Campton, New Hampshire. — *Habenaria Hookeriana oblongifolia* ascribed to New York and Canada by Gray's Manual (edition of 1889), has been found in considerable numbers in a patch of woods near the West Campton schoolhouse. Leaves measured about two and one-half inches by five and one-half. Only one specimen was found in flower. — Phillips Barry.

Lycopodium clavatum, var. monostachyon in northern Maine. — The typical form of *Lycopodium clavatum*, L., has two or more spikes upon each peduncle. The number varies somewhat without changing the habit of the plant. The case, however, in which the two spikes are regularly replaced by a single one gives rise to a rather striking form or variety, which is the better marked from the fact that the single spikes are of greater size than those which compose the pairs in the typical form. The single-spiked variety was briefly characterized by Hooker (Fl. Bor.-Am. ii. 267) from the Rocky Mountains of British America, as var. *monostachyon*, but has been little known and usually omitted from general treatments of the American Pteridophytes. However, Prof. J. M. Macoun in his Catalogue of Canadian Plants, v. 290, records the variety from Little Tobique Lake, New Brunswick (*G. U. Hay*), Prince Edward's Island (*J. Macoun*), and Blood-vein River, Lake Winnipeg (*J. M. Macoun*). The first station for the variety in the United States was reported by Mr. M. L. Fernald last June (Rhodora, iii. 169) on the basis of the

collections secured on Mt. Katahdin by himself and others of the party of New England botanists who visited that mountain in July, 1900. In July, 1901, Mr. Fernald again found this one-spiked variety at Alstead, New Hampshire.

During a recent excursion to northern Maine, Mr. E. F. Williams Mr. Fernald, and the writer had many opportunities to observe the frequency, abundance, and marked character of the variety in northern Aroostook County from Ashland to Fort Kent and also at Grand Falls, New Brunswick. In most places where it was observed it was growing near the typical form, but at Fort Kent it had become the prevailing variety, the typical form being relatively infrequent.

It was noted that two-spiked peduncles occasionally occur upon var. *monostachyon*, but always as the last formed ones of the season's growth. It is a well-known fact that in the feebler growth of a shoot near the end of its growing season reversionary traits are likely to appear. Thus the occasional occurrence of two-spiked peduncles at this late stage in the annual development of var. *monostachyon* does much to confirm the theory that the one-spiked variety has, as in its classification we assume, developed from a recent two-spiked ancestor.— B. L. Robinson, Gray Herbarium.

The "American Fern Book," or "Our Ferns in their Haunts," by Willard Nelson Clute, with illustrations by William Walworth Stilson.[1] — The impetus which has been given to fern study in this country by the Linnaean Fern Chapter and the Fern Bulletin has opened a wide field for fern literature. Hitherto this field has been occupied only by John Williamson's pioneer Ferns of Kentucky, and Fern Etchings, John Robinson's Ferns in their Homes and Ours, Prof. Daniel C. Eaton's classical Ferns of North America, in two large volumes, Dr. Underwood's valuable "Manual," and Raynal Dodge's praiseworthy volume on the New England Ferns and their Allies.

However, in all these works, unless it be Prof. Robinson's and Fern Etchings, the treatment has been more or less technical, while several minor publications — not readily available for general use — have partaken more of the character of descriptive catalogues or out-

[1] Frederick A. Stokes Co., New York.

line lists. It has thus happened that the first really popular work published in this country on ferns, has been Mrs. Parsons' admirable book in which the subject has been treated in an exceedingly pleasing manner. Admirable and valuable as these works have been there has still been wanting some treatise, which, combining the excellent points of the others, should treat ferns in a more comprehensible and popular manner and still keep in touch with the most advanced knowledge of the subject. This want is well met by Mr. Clute's beautiful book.

The author has long been favorably known as one of the best of our fern students, and his identification with the "Fern Bulletin" as its editor, has fitted him admirably for the task of popularizing the really scientific features of fern study and presenting the result in a most attractive manner.

The whole appearance of the book is in its favor, and it is to be warmly commended to fern lovers as the very best book of its kind yet published.

In his treatment of the vexed subject of nomenclature the author has wisely adopted a conservative course, and, for the most part retained the long established familiar names as maintained at Cambridge, and by the best authorities in this country and abroad.

The book is beautifully and profusely illustrated, many of the plates showing the ferns as they grow in nature, and suggesting here Heath's charming book on the English Ferns, while the text is replete with sentiment and legendary lore, much after the manner of Anne Pratt's popular Ferns of Great Britain.

The key at the end of the volume is somewhat original in the simplicity of its treatment and ought to be a great help to beginners in the determination of specimens.

As the scope of the book practically coincides with the range of Gray's Manual, it covers well our New England Ferns and no New England fern student can afford to be without a copy. — George E. Davenport, Medford, Mass.

Self-strangulation in the Virginia Creeper.— About the middle of last June Mrs. J. H. Robinson called my attention to the peculiar fate of a Virginia Creeper (*Ampelopsis quinquefolia*, Michx.) which had been growing beside her cottage at Jaffrey, New Hampshire.

One of the tendrils of the main stem failing to find other support had, as it appears, wound itself around a higher internode upon the same shoot and, after making one complete revolution had turned sharply around enclosing itself in a loop and then encircled the stem in the opposite direction. The knot-like loop, thus formed, was evidently so tight that further enlargement of the stem at this point was stopped. Growth of the adjacent parts, however, continued both above and below giving rise to a deep constriction in which the tendril was buried. This must have occurred during the growing season of 1900. In the spring of 1901 the part of the stem below the tendril put out leaves as usual, but the part above failed to develop its foliage and although still slightly green beneath the outer cortex showed unmistakable signs of death and decay. An examination of several other plants of Virginia Creeper indicates that the tendrils not rarely attach themselves to the stem that bears them but without injuring it. In the case particularly described the suicidal result was doubtless due to an unusually tight knot formed by the tendril. The fact that the stem continued to grow above the stricture and only died as winter came on shows the case to be analogous to the death of a shoot by girdling.— B. L. Robinson, Gray Herbarium.

THE HERBARIA OF NEW ENGLAND.

Mary A. Day.

(Continued from page 222.)

Frost, Charles Christopher. — Mr. Frost's herbarium is now stored in the Brook's Library, Brattleboro, Vermont, and is under control of the library authorities. It consists largely of a set of lichens, a set of Lesquereux' mosses (several hundred numbers in the original fascicles), and an unmounted set of fleshy fungi (usually only rough dried) in pasteboard boxes. Most of the labels accompanying the fungi give only the name of the genus and species, but no data regarding the locality, date, or collector. This part of the collection is now in the basement of the library and is not accessible for study. The lichens are in cases in the main library room and can be seen by visitors.

Fuller, Timothy Otis, Needham, Mass. In 1882 Mr. Fuller

began his herbarium of New England plants, and has increased it steadily year by year. He has 552 genera of phaenogams and vascular cryptogams consisting of 1535 species and 55 varieties, mounted on 2900 sheets. Of these species 139 belong to the pteridophytes, 143 to the *Gramineae*, and 142 to the *Cyperaceae*, the genus *Carex* alone containing 96 species. This herbarium is carefully arranged and fully indexed which facilitates botanical work in it.

Furbish, Kate, BRUNSWICK, MAINE. — Miss Furbish has a herbarium which represents her collections in the different parts of Maine during the last twenty-five years. It is partly organized and contains many of the plants represented by her paintings of the flora of Maine.

Graves, Charles Burr, NEW LONDON, CONNECTICUT. — The herbarium of Dr. Graves represents chiefly the flora of New London, Connecticut, but includes also some specimens from the White Mountains and western Massachusetts. Large collections have been made of the *Gramineae*, *Cyperaceae*, and vascular cryptogams, while the genera *Aster*, *Solidago*, and *Prunus* are well represented. This collection, of perhaps 2000 specimens, contains mosses as well as phaenogams and ferns.

Gray, Asa, see Harvard University, Gray Herbarium.

Green, Arnold, PROVIDENCE, RHODE ISLAND.— For the last thirty years Mr. Green has collected plants in the vicinity of his home, and his herbarium, which contains about 1500 sheets including about 1200 species, is mostly local.

Greene, Benjamin D., see Boston Society of Natural History.

Grout, Abel Joel, BROOKLYN, NEW YORK. — Mr. Grout's herbarium contains about 1500 sheets of Vermont phaenogams, 700 species of Vermont fungi, and 250 species of New England mosses. His collection is especially rich in Vermont asters.

Harger, Edgar Burton, OXFORD, CONNECTICUT.— In 1878 Mr. Harger and the late John Harger, his father, began a collection of plants which has steadily increased until it now contains about 1650 species, represented by 2900 sheets, of flowering plants and ferns, and about 350 species, or 400 sheets, of the lower cryptogams. Nearly 75 per cent of these plants have been collected by Mr. Harger, who has made an attempt to represent as completely as possible the flora of Connecticut, and especially that of the town of Oxford.

Harvard University, Arnold Arboretum, JAMAICA PLAIN,

Massachusetts.— The earliest portion of this collection dates back to 1878 when a few specimens of woody plants were organized as a herbarium. In 1882 it had grown to 6000 or 8000 sheets and August 1, 1900, it numbered 34513 sheets. It consists of specimens of trees and shrubs from all parts of the world, and is specially rich in *Coniferae*. An excellent library of 7300 volumes is connected with it. Professor Charles Sprague Sargent has the direction of this herbarium.

Harvard University, Botanical Museum, Cambridge, Massachusetts.— The herbarium at the Botanical Museum is a working collection for classes in Botany at Harvard College. It contains phaenogams and vascular cryptogams arranged in the order of Engler & Prantl's Natürlicher Pflanzenfamilien. It comprises about 10000 sheets of which about 1000 are Japanese, 1500 European, and 7500 are American. This collection is in charge of Professor George Lincoln Goodale.

Harvard University, Cryptogamic Herbarium, Cambridge, Massachusetts. — The Cryptogamic Herbarium of Harvard University contains the collection of fungi of the late Rev. M. A. Curtis and other valuable collections of fungi and is especially rich in published series of *fungi exsiccati*. The most important representation of lichens is the collection of Professor Edward Tuckerman which was purchased in 1888; other valuable sets of lichens are those of Mr. C. J. Sprague, Professor J. Mueller, and Professor Farlow.

The *Algae* of this herbarium are of wide geographic range — the most extensive set being presented by Dr. C. L. Anderson of Santa Cruz, Cal. Among the exotic species are the sets of Professor G. J. Agardh, Prof. J. E. Areschoug, Mr. E. A. Batters, Dr. Ed. Bornet, Professor C. Flahault, Dr. M. Foslie, Professor E. M. Holmes, F. Hauck, Dr. P. Hennings, Professor F. J. Kjellman, M . A. Le Jolis, Baron F. von Mueller, Maj. T. Reinbold, Professor J. Reinke, Dr. L. K. Rosenvinge, Madam Weber van Bosse, Professor E. P. Wright, and others.

The *Musci* are represented by the herbarium of Mr. W. S. Sullivant, the large collection of Mr. Thomas P. James, and the collection of Mr. Thomas Taylor, all of which have been recently transferred to the Cryptogamic Herbarium from the Gray Herbarium.

An accurate count of the cryptogamic herbarium has never been made but a conservative estimate would place the number of speci-

mens at several hundred thousand. Professor William Gilson Farlow has the care of this herbarium.

Harvard University, Gray Herbarium, CAMBRIDGE MASSACHUSETTS. — Early in his botanical work, about 1835, Dr. Gray began his herbarium and its development remained through the rest of his life one of his chief aims. His own collecting was largely done in the lake-region of western central New York, the southern Alleghanies, the central Rocky Mountains, Mexico, and California. While the plants thus secured are numerous, they form but a very small part of his herbarium. Associated with Dr. John Torrey from 1838 to 1843 in the preparation of the Flora of North America, Dr. Gray received duplicate types of nearly all the plants therein described. Soon after began the notable series of trans-continental surveys which opened up the vast region of the Great West. During this epoch extending from Frémont's Expedition in 1842 to the Natural History Survey of California (the botanical results of which were published in 1876–1880) Dr. Gray's eminence in American botany attracted to him an extraordinary wealth of botanical material from all regions which were being explored. The collections of the Pacific Exploring Expedition, of Charles Wright in Texas, New Mexico, Arizona, Cuba, and Nicaragua, of August Fendler in New Mexico, Venezuela, and Trinidad, of Dr. George Thurber on the Mexican boundary, of Messrs. Brewer, Bolander, and others in California, of Dr. Sereno Watson in the Great Basin, and of Dr. Rothrock in Arizona, merit particular mention on account of their size and importance. Dr. Gray also stood, almost from the beginning of his botanical work, in intimate exchange relations with the leading botanists of Europe, especially England, and derived from this source many extensive additions to his herbarium.

In 1864 Dr. Gray presented his herbarium and valuable library to Harvard College and it was then installed in the building which it now occupies and which had been constructed for it through the liberality of Nathaniel Thayer, Esq. At that time Dr. Gray estimated that it contained 200000 specimens, including both phaenogams and cryptogams. From the early seventies until the end of his life Dr. Gray was engaged in the preparation of the Synoptical Flora, and one source of the great value of the Gray Herbarium arises from the fact that so many of its specimens were critically examined and labeled during the progress of this work. Next in

importance to Dr. Gray's monographic work upon the flora of North America were his studies of the Mexican flora upon the basis of the rich collections of Xantus, Ervendberg, Gregg, Wright, Schaffner, Parry, Palmer, and Pringle, and very full sets of the plants secured by these collectors are to be found in the Gray Herbarium.

In 1870 Dr. Sereno Watson, who had been engaged at the Gray Herbarium in the identification of the extensive material from the Clarence King Exploration of the 40th parallel, was made Assistant, and later (in 1880) Curator of the Herbarium, Dr. Gray still holding the directorship until his death in 1888. After the death of Dr. Watson in 1892, Dr. B. L. Robinson, the present curator was appointed. The staff now includes, besides the curator, two assistants, a collector, and a librarian. The bryophytes and thallophytes have been transferred to the Cryptogamic Herbarium of Harvard University, and the Gray Herbarium, thus restricted to the phaenogams and pteridophytes includes at present 320000 sheets holding from 1 to 5 specimens each, and representing the vegetation of all lands. The usual rate of increase is from 10000 to 14000 sheets annually. Among the most noteworthy collections which have been partially or entirely incorporated in the Gray Herbarium are the herbaria of Jacques Gay, G. Curling Joad, John Ball (all rich in European plants) ; the herbarium of William Boott (containing a wealth of New England material chiefly from the suburbs of Boston, the White Mountains, and Vermont, also an extensive collection of *Carices* from both continents); the herbarium of Dr. George Thurber (noteworthy for its numerous critically examined grasses, as well as many plants of Rhode Island and northwestern Mexico), and the *Compositae* from the herbarium of Dr. F. W. Klatt, of Hamburg, specialist in that group.

The Gray Herbarium is arranged according to Engler & Prantl's Natürlichen Pflanzenfamilien and is open on week-days from 9 A. M. until 5 P. M. except Saturday afternoons. The library contains 12000 volumes and pamphlets. Except for the botanical serials, of which it contains a very full representation, it is nearly restricted to systematic works relating to the phaenogams and pteridophytes and is in its field very complete.

(*To be continued.*)

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Rhodora

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A NATURAL HYBRID BETWEEN HABENARIA LACERA AND H. PSYCHODES.

A. Le Roy Andrews.

In an earlier number of Rhodora (II, 114) I mentioned a form of Habenaria which I had noted growing with *H. lacera* and *H. psychodes* as apparently a hybrid between them. This opinion, based merely upon the general appearance of the plant, is sustained, even better than I had anticipated, by minute examination, and I accordingly venture to report results.

The plant was first noticed by Mr. White, a classmate in Williams College, and myself, late in July, 1898. It was at once marked as distinct and, not having seen *H. fimbriata* at that time, we were inclined to treat it as that species with question marks. Its possible hybrid origin, which I suggested in Rhodora, only occurred to me later. Opportunity for further investigation has been lacking until the present summer. On Aug. 5, 1901, the same locality was again visited and specimens of all forms taken. Comparison of the three types yielded the following characters.

Habenaria psychodes, Gray. Lower leaves oblong or oblong-lanceolate, obtuse or acute, broad, length to 20 cm., width to 6 cm., ratio of length to width 3–5 : 1. Raceme cylindrical, densely many-flowered. Flowers rose-purple. Sepals round-oval, obtuse. Lateral deflexed, concave, horizontal, spreading. Petals cuneate-obovate, retuse, denticulate above, surpassing upper sepal in ratio of about 7 : 5. Divisions of lip broadly cuneate, lacerate; fringe of lateral divisions extending generally less than half their length; ultimate segments many, short, acute. Average width of lip 12 mm. Lateral projecting arms of column obtuse or rounded, much thickened.

Glands of pollen-masses oblique, orbicular. Pollen-masses short, thick; stalk ½ length of mass of pollen or less; pollen yellowish-green. Orifice of nectary unobstructed. Spur longer than ovary, hardly larger below. Ovary short, 7–10 mm.

Habenaria lacera, R. Br. Lower leaves lanceolate or linear-lanceolate, narrow, more acute, length to 21 cm., width to 4.5 cm., ratio 5–7 : 1. Raceme elongated, loosely many-flowered. Flowers yellowish-green. Sepals oblong-oval, less obtuse, lateral deflexed, somewhat twisted, vertical. Petals ligulate, obtuse or sometimes slightly emarginate, entire, about equal in length to upper sepal. Average width of lip about 15 mm.; divisions narrow, linear or nearly so, deeply split, fringe of lateral divisions extending more than half their length, ultimate segments few, capillary, long. Arms of column produced, acuminate, not thickened. Glands of pollen-masses facing, oblong-linear. Pollen-masses long, slender club-shaped; stalk as long as or somewhat longer than mass of pollen; pollen golden-yellow. Orifice of nectary obstructed in middle by projection from base of stigma. Spur of about equal length with ovary, incurved, clavate, considerably enlarged below. Ovary long, 12–15 mm.

Habenaria psychodes × lacera. Lower leaves as in *H. lacera* length to 15 cm., width to 3 cm., ratio 5–7 : 1. Raceme oblong, loosely fewer-flowered. Flowers white tinted rose to light rose-purple. Sepals round-oval, obtuse, lateral deflexed, plane, vertical. Petals cuneate-spatulate, obtuse or slightly retuse, denticulate above, slightly surpassing upper sepal in ratio of about 6 : 5. Average width of lip about 12 mm. Divisions narrow-cuneate, deeply cleft as in *H. lacera*, few, averaging twice as many as in *lacera*, capillary, long. Arms of column as in *H. psychodes* or slightly more acute. Glands of pollen-masses slightly oblique, elliptical or slightly kidney-shaped. Pollen-masses intermediate in length, club-shaped; stalk ¾ length of mass of pollen or rather more; pollen greenish-yellow. Somewhat two-lobed projection from base of stigma not completely obstructing orifice of nectary in middle as in *lacera*. Spur longer than ovary, clavate, much enlarged below. Ovary short or intermediate, 9–12 mm. Locality — a very wet meadow in Pownal, Vermont, July 22, 1898 (*M. W. White & A. L. Andrews*), Aug. 5, 1901 (*A. L. Andrews*).

In a family of many species, variable and often of close relationship, where moreover cross-fertilization is habitual as in the Orchidaceae, hybridization is occasionally to be expected and experiments with the tropical species under artificial conditions have yielded a long array of hybrids presenting characteristics generally intermediate between those of the parent plants. Botanists have accordingly described peculiar intermediate forms found under proper conditions as probable natural hybrids. So the tribe Ophrydeae to which Habenaria belongs has yielded, especially in Europe where represented by many related species, a number of forms which European botanists describe as natural hybrids, mostly in the genera Ophrys

and Orchis. So far as I know no orchid hybrid of any sort has been described from the region covered by Gray's Manual. An explanation could readily be found in the paucity of our species, and the fact that closely related sorts do not generally grow in same localities or bloom at same time.

As will be seen from above descriptions the Pownal plant is almost exactly intermediate between the species, having with the general appearance of *H. lacera* the color of *H. psychodes* while the internal organs are like neither, but a modification of both. Its habitat would point toward the same conclusion. The meadow mentioned is a favorite locality of *H. psychodes* and that species is to be found in all parts of it, *H. lacera* on the other hand being less numerous and growing only in certain parts. The form in question was found only where the two species occurred together. That fact is not necessary to our conclusion as the pollen might have been carried by the insect a considerable distance, but was true for all the specimens which I could find.

The form is too far removed from either species to be readily considered a variety of either and neither tends to such variation when growing alone. It can hardly pass as a species unless found independently somewhere. Moreover it is of slender and weakly growth (a frequent though not invariable characteristic of hybrids), hardly growing above the surrounding grass, while the species in same locality are extremely vigorous. To my mind the greatest argument of all is in the partial development of the projection at the mouth of the nectary which in *H. lacera* serves an important purpose as pointed out by Mr. Gibson in Harper's Magazine (Vol. 94, p. 861. A Few Native Orchids and their Insect Sponsors), but which from its partial development can hardly serve any purpose in our form. The glands are peculiar and I examined a number before satisfying myself as to their shape. I found practically no variation.

The pollen masses were also notably different as described. The color of pollen of hybrid was nearer that of *H. lacera* though distinct from both. The capsules seemed to be maturing seed as is frequently the case with orchid hybrids. The fertility and embryological characteristics of the seeds would be an interesting subject for investigation.

All in all the characteristics of the hybrid seem to show a stronger influence of *H. lacera* and slight variations in the type are in the

direction of that species. European botanists customarily consider the stronger parent the staminate one, though I believe horticulturists adduce exceptions.

Localities where *H. lacera* and *H. psychodes* grow and bloom together should be looked over carefully for similar specimens. Until further information is at hand, the above seems the only reasonable disposition of the plant.

Williamstown, Massachusetts.

A THIRD NEW ENGLAND STATION FOR ASPLENIUM EBENOIDES.

G. A. Woolson.

To the devotee of Nature, few pleasures exceed that of a rare "find." For several years I have been looking for *Asplenium ebenoides,* the suspected hybrid of *A. ebenium* and *Camptosorus.* Late one afternoon last fall I found a place within the limits of Proctor, Vermont, which seemed to offer just the proper environment for this interesting plant. In the strength of my convictions that it should occur there, I returned to the spot July 20th, 1901. Although *Asplenium ebeneum* and *Camptosorus rhizophyllus* were in abundance upon the slopes of the limestone ridge, it was not until I reached the summit, at an elevation of perhaps 800 feet, that I found the object of my search, but there two small plants of *Asplenium ebenoides* with fronds varying from three to five inches in length, were discovered, snugly tucked down in a pocket of the rock. As a photograph of the environment seemed desirable, Dr. H. H. Swift was pressed into service. This gentleman happened to walk around a rock which I had not explored and found another plant of the same kind and by all odds the finest of the lot. Several of the fronds measured ten inches in length, and one, a six-inch member — was rooting at the apex after the manner of one of its probable progenitors. This plant was sixty-eight feet from the other two, and was growing upon a grassy slope, with an eastern exposure.

Three and a half feet from it was a tangled mat of *Asplenium ebeneum* and *Camptosorus rhizophyllus.* A similar mat occurred five feet from the plants in the pocket in the rock, while single specimens

of each in every stage of development were anywhere from six inches to two feet distant. The rock was slightly shaded by sumachs, and the pocket, apparently a misplaced pot-hole, was about six inches in diameter, with a slit in one side. The soil in it looked like ordinary pasture loam, finely pulverized, but with no trace of leaf-mould or disintegrated limestone. It must, however, have had some virtue as three or four inches sufficed to support the two rarities, above described, and a young specimen of *Asplenium ebeneum*. The third plant of *A. ebenoides* grew in richer soil of considerable depth.

Unbelievers in the theory of the hybridity of *A. ebenoides* will find it difficult to gainsay the argument in its favor, which is spread on this grassy slope. The intermediate form of the fronds, their tendency occasionally to root at the tip, the abundance of both the supposed parent-stocks in the immediate neighborhood are matters here well illustrated. Furthermore, if an inability to reproduce from spores is any test of hybridity in a fern, additional testimony can be adduced from this source, for I have searched the section thoroughly and am convinced that not another plant of *A. ebenoides* is to be found in the locality. The presence of a single well-developed specimen with heavily fruited fronds in a perfect environment for the germination of spores must have some significance. The contention over the origin of this unique fern will probably cease only with artificial crossing of the species; this, however seems superfluous when such telling evidence can be obtained from the natural occurrence.

Pittsford Mills, Vermont.

SCIRPUS SUPINUS AND ITS NORTH AMERICAN ALLIES.

M. L. Fernald.

On September 7 Mr. E. F. Williams and the writer found on the sandy shores of Massapoag Lake, in Sharon, Massachusetts, a plant which superficially resembles *Scirpus debilis*, Pursh. The shining black achenes, however, are quite naked, even in their younger stages showing no trace of the perianth of retrorsely barbed bristles which quickly distinguishes *S. debilis* from the related *S. supinus* and *S. Smithii*. A study of the Massapoag plant in connection with the

available American and European material has brought out a number of interesting points in regard to the group of annual species of which *Scirpus supinus*, L., may be taken as the type. This small group of species is characterized by annual roots, rather slender essentially naked culms and few (rarely solitary) sessile spikelets much overtopped by the elongated involucral leaf. The species are superficially very similar, but in the achenes and their subtending scales they show certain very constant differences.

The presence or absence of a perianth of bristles, which has long been considered an important character, does not seem, however, a point sufficiently constant for specific diagnoses. Plants with otherwise identical characters, and differing only in the presence or absence of the bristles are well known in other genera of the *Cyperaceae*.

Among such cases are *Eleocharis Englemanni* and its var. *detonsa*, and *E. palustris*, and its var. *calva*; while in *Eleocharis monticola*, var. *leviseta*, and *Rhynchospora capillacea*, var. *leviseta*, the reduced bristles lack the barbellate character found in the otherwise undistinguishable species. It is not, then, very surprising to find that the extensive area of *Scirpus debilis* at Massapoag Lake quite lacks the characteristic perianth of the species, thus exhibiting a tendency parallel with that found in species of related genera.

The other species of the group are described as lacking the perianth, or in case of *Scirpus Smithii* as having "bristles 1 or 2 minute rudiments or none." A study of the material in the Gray Herbarium shows, however, two sheets of specimens collected by S. B. Mead in Illinois, in 1845, in which the spikelets and the achenes are undoubtedly of *S. Smithii*, but the bristles are as elongated and retrorsely barbed as in typical *S. debilis*. The European *S. supinus* ordinarily quite lacks a perianth, yet one specimen from Versailles distinctly shows rudimentary bristles, while similar rudiments are occasionally seen in its better known American representative, *S. Hallii*. In view of these facts it is apparent that we can no longer rely for final specific distinctions upon the presence or absence of bristles in this group; and that the characterizations of the species as now treated in our manuals must be considerably modified. Study of all the material at hand shows that in the achenes themselves we find characters of such constancy as to furnish a much safer basis for classification. The color of the achenes in all the species is very variable, but the shape and deeper markings supply the characters upon which is based the following synopsis.

Synopsis of Species.

* Achenes transversely wrinkled; bristles normally absent.

+ Achenes distinctly triangular in cross-section.

S. supinus, L. Plant 2.5 dm. or less high; the involucral leaf erect and very elongated, nearly or quite equalling the true culm: spikelets ovoid-lanceolate, acutish, 5 to 12 mm. long: the ovate or suborbicular ferruginous round-tipped scales short-mucronate: styles 3-cleft. — Spec. 49; Reichenb. Ic. Fl. Germ. viii. t. 302; Boeckeler, Linnaea, xxxvi. 699, in part; etc. — Continental Europe.

S. saximontanus. Very slender, 2 cm. to 3 dm. high, sparingly short-leafy at base; the erect involucral leaf one-half to one-fourth as long as the true culm: spikelets 1 to 4, oblong-cylindric, acute, 5 to 12 mm. long: scales ovate, cuspidate-acuminate, the margins pale brown: styles 3-cleft: achenes dark brown or black, 1.5 mm. long, one face slightly broader than the other two. — *S. supinus*, Gray, Man. Ed. 5, 563; Watson, Proc. Am. Acad. xviii. 171; Hemsl. Biol. Cent.-Am. Bot. iii. 462; not L. *S. Hallii*, Britton, Trans. N. Y. Acad. Sci. xi. 77, in part, not Gray. — Colorado, banks of La Poudre River, Greely, Sept. 20, 1872 (*E. L. Greene*): Texas, without locality (*Charles Wright*): Ciboto, June, 1847 (*F. Lindheimer*): San Luis Potosi, low ground, Penasco, 1876 (*J. G. Schaffner*, no. 571).

+ + Achenes plano-convex.

S. Hallii, Gray. Slender, 1 to 4 dm. high; the erect involucral leaf usually one-half to one-fourth as long as the true culm: umbel rarely branched, of 1 to 7 linear- or oblong-clyindric acute spikelets 0.5 to 1.5 cm. long: scales ovate, cuspidate-acuminate, the margins brownish: styles 2-cleft. — Man. ed. 3, addend. xcvii; Britton, l. c., in part, and in Britton and Brown, Ill. Fl. i. 264, fig. 615. *S. supinus*, var. *Hallii*, Gray, Man. ed. 5, 563. — Massachusetts, Winter Pond, Winchester, Aug., Sept. (*Hitchings*, *Boott*, *Faxon*, *et al.*): Illinois, Menard Co., 1861 (*E. Hall*): Florida, Indian River (*Curtiss*, no. 3118*): Missouri, St. Louis, Sept., 1845 (*Geo. Englemann*).

* * Achenes smooth or merely pitted.

+ Achenes unequally bi-convex or lenticular.

S. debilis, Pursh. Comparatively stout, 6 dm. or less high; the erect or deflexed involucral leaf usually one-fourth to one-eighth as long as the true culm: spikelets 1 to 12, ovoid-oblong, bluntish, 0.5 to 1 cm. long: scales orbicular to broad-ovate, with tawny margins: achenes more or less pitted, broadly obovoid, contracted to a short

stipiform base; bristles 6, rather stout, retrorsely barbed, 2 or 3 surpassing the achene. — Fl. i. 55; Gray, Man. 527; Torr. Fl. N. Y. ii. 352, t. 139; Britton, Trans. N. Y. Acad. Sci. l. c., in part, and in Britton & Brown, l. c., fig. 616. *S. supinus*, *β*, Boeckeler, l. c. — Sandy or muddy shores from Industry, Maine (*Fernald*) and Burlington, Vermont (*Eggleston*) to Minnesota (*Hale*) and the Gulf of Mexico.

Var. **Williamsii**. Bristles entirely wanting: otherwise like the species.— Massachusetts, sandy shore of Massapoag Lake, Sharon, Sept. 7, 1901 (*E. F. Williams & M. L. Fernald*).

+ + Achenes plano-convex, one face distinctly flattened.

S. Smithii, Gray. Slender, 0.5 to 4 dm. high; the erect involucral leaf usually one-half to one-third as long as the true culm: spikelets 1 to 5, ovoid-oblong, acutish, 0.5 to 1. cm. long: scales oblong-ovate, greenish or brown-tinged: achenes cuneate-obovoid, smooth or minutely pitted; bristles none or minute rudiments.— Man. ed 5, 563; Britton, Trans. N. Y. Acad. Sci. l. c., & in Britton & Brown, l. c. fig. 617. *C. debilis*, Britton, Trans. N. Y. Acad. Sci. l. c. as to Maine plant, not Pursh.— Shores, Maine, Harrison, 1871 (*J. Blake*): Vermont, Ferrisburg, Sept. 14, 1881 (*E. & C. E. Faxon*): Rhode Island, Great Pond, South Kingston, Oct. 25, 1880, and Lake Werden, Aug. 24, 1881 (*E. & C. E. Faxon*): New York, Sacketts Harbor, Lake Ontario, 1833 (*A. Gray*, Gram. & Cyp. no. 135); Sodus Bay, Lake Ontario, 1866 (*J. A. Paine*); Stirring Lake, 1878 (*H. L. Hoysradt*): New Jersey, Delaware River, Red Bank, July, 1865 (*C. E. Smith*); Camden, Oct. 7, 1877 (*C. F. Parker*): Pennsylvania, Schuylkill River, Penrose Ferry, Sept. 14, 1867 (*C. E. Smith*); Presque Isle, Sept. 4, 1868 (*T. C. Porter*): Michigan, Pine Lake, Ingham Co., July 25, 1891 (*C. F. Wheeler*).

Var. **setosus**. Perianth of 4 or 5 slender retrorsely barbellate bristles mostly exceeding the achene.— Illinois, Augusta, 1845 (*S. B. Mead*).

Gray Herbarium.

Several uncommon Fern-allies from northwestern Massachusetts — A few pteridophytes found in and about Williamstown in the summer of 1901, which appear to be rare in the state seem worthy of record.

Toward the end of May, while collecting mosses and hepatics about the base of Mt. Greylock, I was fortunate enough to find a number of minute specimens of *Botrychium simplex*, E. Hitchcock. They

were growing in a pasture not far from a brook in New Ashford. Two or three weeks later, in June. I was kidnapped and taken up the mountain by several members of the New England Botanical Club who arrived in Williamstown intent upon "doing" Greylock. Among other finds, made during this excursion, were *Botrychium lanceolatum*, Angstr. and *B. matricariaefolium*, Braun, both occurring in great numbers upon the lower slopes of the mountain in Williamstown.

August 27th as I was again collecting bryophytes on Mt. Greylock — this time along the "Notch" in North Adams, near the road to the "Bellows-pipe"— two interesting lycopods revealed themselves, namely: *Lycopodium inundatum*, L., rather uncommon in Massachusetts, and *L. Selago*, L., an alpine species for which Dodge in his Ferns and Allies of New England mentions only one Massachusetts station, Mt. Watatic. I noted but one small station for each. They were growing upon banks near cold streams, which drain the northeastern face of the mountain. Singularly enough, the altitude was about two thousand feet, which is exceptionally high for the lowland *L. inundatum* and unusually low for the alpine *L. Selago*. Although Greylock rises to three thousand five hundred and five feet, I have never seen either of these Lycopodiums on other parts of the mountain.

On September 2nd, 1901, I found *Equisetum variegatum*, Schleicher, about the edge of a swamp in Williamstown. *E. scirpoides*, Michx. is rather frequent in the mountain woods of this vicinity. — A. Le Roy Andrews, Williamstown, Massachusetts.

Euphorbia corollata at Concord, Massachusetts. — On August 5th, 1901, Mr. H. A. Purdie and I found a single plant of *Euphorbia corollata* L. in full bloom on my farm at Concord, Massachusetts. It was growing in a damp meadow on the edge of a belt of alders and gray birches which surrounded a small pond-hole. The meadow is bordered on one side by extensive oak and white pine woods, on the other by an apple orchard, just beyond which, at a distance of about two hundred yards from the meadow, stands an old farmhouse. There are no indications that a flower garden has ever existed on the intermediate ground, nor were we able to discover other plants of this Euphorbia anywhere in the neighborhood. — William Brewster, Cambridge, Massachusetts.

Hydrocoleum holdeni nom. nov. — In Rhodora 1: 97. 1899, Mr. Holden describes a species of Hydrocoleum from Bridgeport, Connecticut, under the name of *Hydrocoleum majus*. In view of the fact that this name is preoccupied by *Hydrocoleum majus* Martens, Proc. As. Soc. Bengal, 183. 1870, the Bridgeport plant should receive another name and it is suggested that it be known hereafter as *Hydrocoleum holdeni*. Specimens of it have been distributed in Phycotheca Boreali-Americana as no. 602. — Josephine E. Tilden, University of Minnesota.

A luxuriant growth of Juniper. — *Juniperus communis*, var. *Canadensis*, Loudon., in Glastonbury, Connecticut, is a noticeable and conspicuous shrub on many of the dry hills and pastures of the town. In height these junipers have no uniform growth, but the outline is sure to be circular, at least where the patches are of good size. The central portion is often four to ten feet high, ascending, with trunks having few or no living branches near the base, finally topping out into a spreading, secund, evergreen growth.

The middle and outside portions of more recent growth, show less dead wood than the inner, with trunks and main branches more or less leafy to the base, the angle of ascent generally uniform all around.

Among the many and varied patches in this vicinity there is one of striking and remarkable appearance, exceptional even among others of large size. This I discovered on April 28, 1901, and a careful measurement around the outside branches showed a total circumference of ninety-eight feet. The central portion was about four feet in height and the outside about two feet. The entire growth of this mass of evergreen was almost free from dead wood, and only when the outside branches were laid back could the brown bare trunks of the inner portion be seen. The place was again visited on August 1, 1901, and the circumference had increased two feet, making it an even hundred.

Stepping into the growth I found the trunks and branches so massed and twisted as to sustain my weight. So far as I examined I could find no portion of the patch which had not made a growth of at least three to four inches during the season to date. — A. W. Driggs, East Hartford, Connecticut.

HERBARIA OF NEW ENGLAND.

MARY A. DAY.

(Continued from page 244.)

Hervey, Eliphalet Williams, NEW BEDFORD, MASSACHUSETTS, — The herbarium of Mr. Hervey, containing about 1200 species, was collected chiefly during the years between 1860 and 1890. The plants in it are for the most part local and represent an area of about 10 miles in diameter around the city of New Bedford, many of them having been collected on the shores of Buzzards Bay. The larger part of the specimens were collected by Mr. Hervey and formed the basis of his Flora of New Bedford.

Hitchcock, Charles Henry, see Dartmouth College.

Hitchcock, Edward, see Amherst College.

Hitchings, E. H. Mr. Hitchings' collection of orchids is at the Massachusetts Horticultural Society, and his collection of ferns in the possession of the Appalachian Mountain Club. The latter contains 157 species and 13 varieties belonging to the United States and 44 species and varieties from Mexico. They are all mounted on double sheets and kept in dust-proof boxes.

Holden, Isaac, BRIDGEPORT, CONNECTICUT. — This herbarium is confined to the *Algae* and contains about 6000 specimens collected in great part by Mr. Holden himself during the last fifteen years. It contains a full set of Phycotheca Boreali-Americana of Collins, Holden, and Setchell. The marine *Algae* are mostly from the New England coast, especially from Long Island Sound, and the fresh water *Algae* from the vicinity of Bridgeport, Connecticut.

Horsford, Frederick Hinsdale, CHARLOTTE, VERMONT. — Mr. Horsford's herbarium containing over 4000 specimens of plants was purchased by Professor J. M. Coulter several years ago and is now at the University of Chicago. It contained many grasses, many fresh water algae, and some of Mr. Pringle's sets. Mr. Horsford gave his several thousand duplicates containing some of the rarer plants of Mt. Mansfield and the White Mountains to the Kent Scientific Society of Grand Rapids, Michigan.

Hunt, Edwin. — Mr. Hunt lost all his collection by fire in 1866. After that time he collected extensively in Sudbury, Massachusetts,

and also at Nantucket, Martha's Vineyard, Salem, and Newburyport. His herbarium was purchased by the Asa Gray Botanical Club, Utica, New York, in 1887, but has since been given to the Oneida Historical Society of Utica.

James, Thomas Potts, see Harvard University, Cryptogamic Herbarium.

Jenks, Charles William, Bedford, Massachusetts. — The greater part of Mr. Jenks' herbarium has been collected within a radius of five miles from Bedford Centre, but a few of the earlier collections were made in Groton and other parts of Middlesex County. It contains about 1900 sheets of phaenogams and vascular cryptogams accumulated since 1881.

Jesup, Henry Griswold, see Dartmouth College.

Kennedy, George Golding, Readville, Massachusetts. — The phaenogamic and vascular cryptogamic part of Dr. Kennedy's herbarium contains about 9000 sheets of plants from New England and Lower Canada, northern and alpine New Hampshire and Vermont being specially represented. The flora of Willoughby, Vermont, is nearly complete, being represented by 685 species. Since 1895 Dr. Kennedy has collected mosses and he now has a collection of between 11000 and 12000 specimens from both Europe and America, including the mosses from the herbarium of Miss Clara E. Cummings which he has recently purchased. A good bryological library is an adjunct to this herbarium and contains some interesting and valuable books — among them Dillennius, Historia Muscorum, London, 1741, a copy which belonged to Dawson Turner containing his autograph notes and many letters from Sir James Edward Smith bound as an appendix; also William Wilson's copy of Schimper's Synopsis Muscorum, presented by Schimper and containing many notes by Wilson.

Kidder, Nathaniel Thayer, Milton, Massachusetts. — Mr. Kidder's herbarium, commenced about 18 years ago, consists chiefly of the plants of Norfolk and Suffolk Counties, Massachusetts, and includes many rare specimens from this region.

Lowell, John Amory, see Boston Society of Natural History.

Mann, Horace. — In 1870 President Andrew D. White purchased the herbarium of Horace Mann and presented it to Cornell University, thus forming the basis of the present collection at Cornell. In Mr. Mann's herbarium were many plants from New England, the White Mountain region being best represented; also a set of his Hawaiian specimens.

Mann, Horace, the younger. At the Public Library, Concord, Mass., is a collection of about 600 plants of Northern United States mounted and arranged systematically in cases. This belonged to the son of Horace Mann, the educator.

Manning, Warren Henry, Boston, Massachusetts. — Mr. Manning's herbarium contains about 1500 species and varieties of herbaceous plants and about 275 of woody plants. The former are mostly from the region covered by Gray's Manual, the larger part having been collected by Mr. Manning in New England, Minnesota, and northern Wisconsin. The woody plants include a large number of horticultural forms collected in the Arnold Arboretum and on the Biltmore Estate in North Carolina; they are arranged in alphabetical order by genera and species, but the herbaceous plants are in botanical sequence.

Massachusetts Agricultural College and Experiment Station, Amherst, Massachusetts. — About 1870 this herbarium was started and now contains nearly 25000 specimens which are divided as follows: phaenogams and pteridophytes 12000, (purchased from W. W. Denslow) representing foreign as well as American flora; *Musci*, 1000 species including collections from W. W. Denslow, C. F. Austin, C. H. Peck, and others; *Hepaticae*, 100 species including the Thuringenschen Staaten collection of W. O. Müller; *Fungi* 10000 species, both foreign and American; *Lichens* 1200 species containing fascicles 1–6 of Edward Tuckerman's distribution. A part of the herbarium is located at the College and a part at the Experiment Station.

Massachusetts College of Pharmacy, Boston, Massachusetts. — Dr. William P. Bolles started a collection for this college in 1877. It now numbers about 5000 specimens which are mostly medicinal plants both local (of which there is a good representation) and of broader range. Dr. Bolles' private collection, which has been given to the College, consists of about 4000 mounted sheets, organized but not very accessible.

Massachusetts Horticultural Society, Boston, Massachusetts. — The largest part of the herbarium of the Horticultural Society consists of Mr. George E. Davenport's collection of ferns, containing about 3200 specimens. There are several other small collections embodied in the herbarium, among these is one made by Dennis Murray of Roxbury, of about 275 species of the flowering

plants of Boston, native and introduced grasses and vascular cryptogams; also the collection of orchids made by E. H. Hitchings. Little effort has been made for its development except in the collection of ferns.

Metropolitan Park Commission, Boston, Massachusetts, see New England Botanical Club.

Middlebury College, Middlebury, Vermont. — The herbarium of this college contains about 6000 species and is chiefly confined to Vermont plants. It is in charge of President E. Brainerd and Dr. E. A. Burt.

Middlesex Institute, see New England Botanical Club.

Morong, Thomas.— Dr. Morong's entire herbarium is now at Barnard College, New York City, but is soon to be moved to the New York Botanical Garden at Bronx Park. A nearly complete set of his Potamogetons is in the herbarium of Mr. Walter Deane. It is believed that many of the aquatics from the herbarium of Dr. James W. Robbins were incorporated in the Morong herbarium. The herbarium is in charge of Professor N. L. Britton, director of the New York Botanical Gardens.

Morris, Edward Lyman, Monson, Massachusetts (Temporarily at Washington, D. C.) — This herbarium contains over 10000 mounted and unmounted sheets, nearly one third of which are from the Connecticut Valley of Massachusetts and Connecticut. To New England botanists the chief interest lies in the Dr. Walter H. Chapin (of Springfield) collection of grasses and ferns, which in 1885 contained more species of these plants than had hitherto been reported from this region. From the United States and Canada, the *Plantaginaceae* are well represented. Mr. Morris's sheets are available for study upon request.

Morss, Charles Henry, Medford, Massachusetts. — Mr. Morss has a herbarium of about 1200 specimens of New England plants collected chiefly by himself.

Mount Holyoke College, South Hadley, Massachusetts.— There is at this college a herbarium of about 7000 specimens of plants representing both phaenogams and cryptogams. Its geographical range is a broad one, as many of the plants have been collected by graduates of the college who have gone to foreign countries as missionaries, India and the Hawaiian Islands being specially represented. Here also may be found a part of the herbarium of Dr. J.

W. Robbins of Uxbridge including a full set of his Potamogetons. The herbarium of Mount Holyoke College is in charge of Miss H. E. Hooker.

New England Botanical Club, CAMBRIDGE, MASSACHUSETTS. — In 1896 the New England Botanical Club started a collection of plants which has increased until it now numbers about 15000 sheets of specimens, mostly mounted and organized. It contains the herbarium of Herbert A. Young, which was the basis of his flora of Oak Island, Massachusetts, the herbarium of the Metropolitan Park Commission, representing the flora of the large Park-reservations about Boston, and the herbarium of the Middlesex Institute, including most of the plants upon which Dame & Collins' Flora of Middlesex County was based; also many duplicates from the herbaria of William Boott, and Edwin and Charles E. Faxon. It is now located in one of the rooms of the Gray Herbarium.

Norwich Free Academy, NORWICH, CONNECTICUT. — The herbarium at Norwich Free Academy is in charge of Mr. Martin E. Jenson, and contains about 1000 mounted specimens of phaenogams and cryptogams. The geographical range is New London County, Connecticut. Many of the plants of Case & Setchell's Catalogue are represented in this herbarium.

Oakes, William. — Mr. Oakes collected plants in large numbers and distributed many to his botanical friends. After his death in 1848 the plants left by him were made into sets and sold, the first, best, and most complete set being purchased by the Boston Society of Natural History, where it is now incorporated into the New England herbarium. The Essex Institute had about 400 species which are now at the Peabody Academy of Science. A very full set is also at the Gray Herbarium.

Olney, Stephen Thayer, see Brown University.

Owen, Mrs. Maria Louisa, SPRINGFIELD, MASSACHUSETTS. — The rare plants of Nantucket which are mentioned in Mrs. Owen's Catalogue of the plants growing without cultivation in the county of Nantucket, Massachusetts, are deposited in the herbarium of the Springfield Botanical Club.

Parlin, John Crawford, NORTH BERWICK, MAINE. — The present herbarium of Mr. Parlin dates from 1894 and contains about 1800 specimens of phaenogams and vascular cryptogams, chiefly from Maine, though a few are from New Hampshire, Massachusetts,

and North Carolina. In Maine the best represented region is York, eastern Oxford, western Androscoggin, and Cumberland Counties. Mr. Parlin's collections previous to 1894 were purchased by the Gray Herbarium of Harvard University.

Peabody Academy of Science, Salem, Massachusetts. — The herbarium of the Peabody Academy of Science (established in 1867) originated in the collections received from the Essex Institute (established in 1848), a portion of which came from the earlier collections of the Essex County Natural History Society (established in 1834). When received by the Academy in 1868 the dried plants were unmounted, and with them came numerous specimens of woods, fruits, gums, etc. The Academy herbarium is intended to be exhaustive only so far as to cover the flora of Essex County, Massachusetts. Some special collections, however, from outside this limit are preserved to illustrate all the orders of plants. The Essex County plants received in 1868 numbered about 500 specimens, collected chiefly by William Oakes, Rev. J. L. Russell, and George D. Phippen. In 1875 an effort was made to develop the herbarium in connection with the preparation of the county flora, the specimens for this purpose being collected principally by John H. Sears and John Robinson. In 1880 Mr. John Robinson published his Flora of Essex County, Massachusetts. The herbarium now contains 4420 specimens of plants belonging to the Essex County flora, and about 3200 specimens of plants of wider range. Among the latter are many specimens distributed by A. H. Curtiss, George Vasey, C. G. Pringle, a set of C. F. Austin's *Hepaticae*, and *Algae* collected by Mrs. A. L. Davis.

The collection of Essex County woods, containing upwards of 500 specimens, consists of cross- and longitudinal-sections together with the fruit of the nut- and cone-bearing trees. It includes a set of blocks and long sticks of the wood of Essex County trees to which the government tests for specific gravity, tensile strength, etc., were applied in 1880 and which are described individually in Professor Sargent's report in the ninth volume of the publications of the tenth census. Mr. John Robinson has the care of this herbarium.

Perkins, George Henry, see University of Vermont.

Portland, Society of Natural History, Portland, Maine. — The existing herbarium of this Society, now in charge of Mr. Joseph P. Thompson, dates back only to 1866, or since the great fire in the city of Portland which destroyed nearly all the collections of the

Society with its building. A few plants of the early surveys of Maine had been taken out for examination and thus escaped being burned. The Maine specimens and many of the other plants, excepting Dr. Wood's collection received since his death in 1899, have been mounted and organized.

Preston, Howard Willis, PROVIDENCE, RHODE ISLAND.— Mr. Preston's herbarium consists mainly of specimens collected by himself in New England and Florida, and numbers about 1500 specimens. Of late years his attention has been given to collecting woods and microscopical mounts of timber.

Pringle, Cyrus Guernsey, CHARLOTTE, VERMONT. — In Mr. Pringle's herbarium nearly four-fifths of the species of Patterson's Check-list of the plants of North America are represented with several specimens for each. Of Mexican plants Mr. Pringle has a full set of his own collections amounting to about 16000 specimens. He also has nearly half the species of Europe and surrounding regions represented by several specimens of each. These are all mounted and arranged in regular herbarium cases.

Rand, Edward Lothrop, CAMBRIDGE, MASSACHUSETTS. — This herbarium includes the plants of Mt. Desert Island, Me., but it is representative of the flora of the coast of Maine between Penobscot Bay and Eastport. It is probably the only collection of exclusively Maine coast plants available for study, and contains at least 15000 specimens. It was commenced about 1880 as the basis of a list of the plants of Mt. Desert Island. Its increase during the first years was not rapid, but in 1888 Mr. Redfield combined with Mr. Rand to make the flora as complete as possible. Mr. Redfield contributed a full set of all plants collected by him, but this valuable addition was destroyed by fire in New York while on its way to Boston. Efforts were made to repair this loss and in 1894 at the time of the publication of the Flora of Mt. Desert all the plants mentioned in the catalogue were represented by specimens with few exceptions, most of these being lichens collected by Dr. Eckfeldt. Since that time whenever a plant has been reported at least one specimen has been deposited in the herbarium.

The plants are nearly all unmounted but carefully preserved in folders. Nearly every species is represented by a number of specimens from different parts of the Island and in cases of difficult genera there is a large supply of material for comparison. As the work on

the Mt. Desert flora still progresses some hundreds of specimens are added to the herbarium each year.

A nearly complete duplicate set of the phaenogamic plants covering the work up to 1895 is now deposited in the Academy of Natural Sciences at Philadelphia.

Rhode Island College of Agriculture and Mechanic Arts, Kingston, Rhode Island. — The collection of plants at this college is mostly cryptogamic including Ellis's Fungi Columbiani, Seymour and Earle's Economic Fungi, Briosi and Cavara's Parasitic Fungi of cultivated plants, Arthur and Holway's *Uredineae*, together with a small collection of native seed-plants. The herbarium at the Experiment Station is small but includes a collection of Halsted's American weeds and many economic fungi.

Rich, William Penn, Boston, Massachusetts. — Mr. Rich commenced his herbarium in 1878, confining it strictly to New England plants. It contains about 1700 species represented by numerous sheets showing distribution and various stages of growth, comprising in all about 4000 sheets. The asters, the solidagos, the grasses, and the sedges have been collected most extensively. The flora of eastern Massachusetts is more fully represented than that of any other section.

Robbins, James W. — In 1872 Dr. Robbins' herbarium was divided and a part sent to Mt. Holyoke College and a part to the South Natick Historical and Natural History Society. An excellent set of the exsiccati distributed by Dr. Robbins is in the Gray Herbarium. A full set of his aquatic plants is believed to be in the herbarium of the late Dr. Thomas Morong.

Sanderson, Charles Henry Kellogg. — During the last ten years of his life Mr. Sanderson made a collection of the flowering plants and ferns of Greenfield, Mass., and vicinity. At the time of his death, in 1884, his collection numbered over 1300 mounted sheets of plants and a large number of unmounted specimens. Mrs. Sanderson now keeps the herbarium of her husband at her home in Greenfield.

Sears, John Henry, Salem, Massachusetts. — Mr. Sears has a special collection of about 1000 sheets of *Ranunculaceae* from all parts of the world.

(*To be continued.*)

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ALBINO FRUIT OF VACCINIUMS IN NEW ENGLAND.

WALTER DEANE.

MISS HELEN F. AYRES of Medford, Massachusetts, has sent me specimens of a white-berried blueberry, *Vaccinium pennsylvanicum*, Lam., collected by her in the town of Fitzwilliam, New Hampshire, and she has also kindly furnished me with such full information in regard to the plant and its surroundings that I am enabled to make the following note. The bushes grow in a pasture and cover a space of about one square rod. The pasture in this locality is on a side hill and the soil is not rocky but rather dry. Some of the bushes are under the shade of the neighboring trees, while others are exposed to the sun. The plants are from six to eight inches tall and have been growing on this spot year after year for a long time, one bush having been found here about twenty years ago. There are now about twenty bushes in all and they bear only white berries, no other bushes in the town bearing berries of this color. A number of bushes of the typical *Vaccinium pennsylvanicum* are growing among the white-berried forms, and in the neighborhood are found various kinds of blueberries, *Vaccinium corymbosum* and its variety *atrococcum*, *V. pennsylvanicum*, which comprises nine-tenths of the berries in the pasture, and its variety *nigrum*, besides the common huckleberry, *Gaylussacia resinosa*, a plant not common in Fitzwilliam. The pasture supports a luxuriant growth of thistles, evening primroses, chokeberries and other plants which crowd the ground.

Miss Ayres sent me fresh specimens of the white-berried blueberry and other interesting forms growing near. They were gathered by her on August 15 last, on which day the white berries were falling rapidly, though the others still remained on the bushes. I received

these specimens on the next day, the 16th, and was thus enabled to make observations on them as if I had picked them on the spot. In the white-fruited form the berries were fully ripe and very sweet in comparison with those of the type, and the skin was very thin. They were translucent and the color was a creamy white, while in most cases the berries had a light rosy tinge on the side exposed to the sun. The calyx tips in many cases were of a light pinkish color, but in other respects the plant was typical.

Messrs. E. L. Rand and J. H. Redfield have recorded white-berried plants of this species from Mount Desert, Maine (Flora of Mount Desert, Maine, 1894, p. 124). Mr. Rand tells me that he found the plant on Jordan Mountain, September 2, 1892, and that the fruit was of a dull white, tinged with red, especially at the apex, but not pure albino. He has sent me specimens. These instances of white-fruited *Vaccinium pennsylvanicum* are the only ones that I am acquainted with from New England. Prof. Thos. C. Porter in 1894 (Bull. Torr. Club, XXI, pp. 121, 122) reported white-berried forms of this same species from Monroe County, Pennsylvania, and according to the precedent of Prof. Britton's *Gaylussacia resinosa*, forma *leucocarpa* (Bull. Torr. Club, XVII, 1890, p. 125) I will designate this form *Vaccinium pennsylvanicum*, forma **leucocarpum**. Its continued occurrence for so many years in the same place entitles it to some formal recognition. In my list of New England *Ericaceae* (Rhodora 1, 1899, p. 94) this form should be entered with a cross for New Hampshire and Maine.

I examined carefully the other specimens of *Vaccinium pennsylvanicum* growing near forma *leucocarpa* and I will record briefly the results. There are five forms: — 1, The typical form, berries black with heavy bloom, taste normal; 2, berries black with slight bloom, taste as in no. 1, rest of the plant typical; 3, berries black without bloom, taste as in no. 1, but leaves hirsute below on the midrib, oblong lanceolate, shining on both sides, twigs warty as in the type; 4, berries dull red without bloom, taste insipid, plant otherwise typical; 5, berries dark red with bloom, taste insipid, plant otherwise typical. In all these cases the fruit was perfectly ripe. These five forms I would regard as merely individual variations whose persistency has yet to be proved. (See also Flora of Mount Desert, Maine, 1894, p. 124.)

I received from Mr. Arthur S. Pease of Andover, Massachusetts, on July 28 last, fresh specimens of *Vaccinium corymbosum*, var. *atrococcum*

(a variety of our high bush blueberry) with white berries collected by him in Andover on July 27. The berries were translucent and of a creamy white color, the skin was very thin, but the taste, unlike that of the white-berried form described above, was insipid. Mr. Pease, in the letters of information which he kindly wrote me, says, "There is only one bush, growing on a hillside among bushes of the type and var. *atrococcum*. The bush is about five or six feet high and does not seem to differ at all from the bushes about it. . . . . The insipid taste in the berries which you remarked upon I myself noticed, as did all the other persons who tasted the berries that I gathered— I find that berries of this sort have been gathered in this locality for at least eight or ten years and perhaps longer." The persistency of this white-fruited blueberry seems to entitle it to recognition as *Vaccinium corymbosum*, var. *atrococcum*, forma **leucococcum**. It should be entered on my list with a cross for Massachusetts. All the specimens described above by me from fresh material are in my herbarium.

Mr. William Brewster tells me that there is a high bush blueberry, *Vaccinium corymbosum*, L., bearing white berries on his farm in Concord, Massachusetts. Local tradition affirms that this bush has fruited many years.

Mr. E. L. Rand has kindly shown me specimens of a white-fruited Canada blueberry, *Vaccinium canadense*, Kalm., collected by Miss Harriet A. Hill of Belmont, Massachusetts, early in September, 1901, in Gouldsboro, Maine. Captain George Allen of Gouldsboro told Miss Hill of the blueberries and conducted her to the locality. I will quote the following from Miss Hill's letter to Mr. Rand describing the situation: —

"We went up a slight rise of land to a small clearing where there was a thick growth of the Canada blueberry, mountain cranberry, brakes, golden-rod, etc. All around was a scattering growth of spruces, canoe birches, yellow birches and balsam firs. In the middle of the clearing on the westerly slope of the ridge we found a patch about ten feet square of the white Canada blueberry, surrounded on all sides by the common variety. So far as we could see there was no difference in the soil or the environment of the two varieties. They grew side by side yet each perfectly distinct. Capt. Allen told us that they had been there ever since he could remember." Mr. Rand has seen fresh fruit from this locality and he describes the color of the ripe berries as a dead waxy white, that of the unripe fruit being a

yellowish hue. From my examination of the specimens the plant is in all other respects typical. I will designate it *Vaccinium canadense*, forma **chiococcum**.

Prof. Wm. G. Farlow records white-fruited *Vaccinium canadense* from Shelburne, New Hampshire (Garden and Forest, II, 1889, pp. 50, 51). This form should be entered in my list with a cross for Maine and a line for New Hampshire.

I will mention two records outside of New England. *Vaccinium vacillans* with white berries is recorded from the sand region east of Chicago, Illinois, by Mr. E. J. Hill (Garden and Forest, VIII, 1895, p. 503). He says that the plants are known to the berry pickers, thus indicating that the form is a persistent one, and he thinks that the seeds are fertile.

Prof. Thos. C. Porter in 1889 (Bull. Torr. Club, XVI, p. 21) records white-berried *Gaylussacia resinosa* from Pennsylvania and New Jersey.

The writer will be very glad to hear of any other stations in New England or elsewhere for white-berried forms of *Vaccinium* or *Gaylussacia*.

Cambridge, Massachusetts.

MISCELLANEOUS NOTES ON NEW ENGLAND FERNS,— II.

George E. Davenport.

3. In the course of these notes some important changes will be adopted, but in all cases such explanations will be given as will render the reasons therefore clearly understood.

For instance: — The Lady fern, until quite recently, has been known to American fern students as *Asplenium filix-foemina* although Prof. Eaton, and Dr. Underwood have recognized Roth's *Athyrium* as a section of *Asplenium* in accordance with the treatment of Hooker and Baker.

Many excellent authorities, however, have regarded *Athyrium* as wholly distinct from *Asplenium* and kept the two apart. The former appears to be well represented by a group of ferns quite distinct in habit, structure and the character of their sori from *Asplenium*

as now understood, and there appears to be a steadily increasing tendency towards its more general recognition.

The latter genus (*Asplenium*), as defined by Linnaeus, originally embraced all ferns with their sori arranged in lines diverging from the midribs, but in, or about 1800 (exact date uncertain), Roth[1] noticed that certain species of *Asplenium* produced a large proportion of peculiarly curved sori mixed with the regular straight (asplenioid) form, and deeming this to be of sufficient importance to constitute a new generic character, he founded upon it his genus *Athyrium*. As the special character of the athyrioid sori is the subject of the following note there is no need of dwelling on it further here, but it is a little singular that the very first species mentioned by Roth, *A. fontanum*, under his new genus should have asplenioid sori, so that if it were not for the clear and unmistakable description of the *semi-lunar* sori as he called them in his text, and his explicit declaration that it was these *semi-lunar* sori which led him to propose a new genus, the validity of the genus itself might be seriously questioned. John Smith (in "Historia Filicum") says of it that it is better represented by the habits and character of the ferns comprising it than by the shape of the sori, but Moore more correctly apprehended Roth's views in saying that the genus is best known by the character of its peculiar sori.

Probably the truth of the matter may be in the combination of all of these characters, as it is certain that true *Athyria* may be quite as readily distinguished from *Asplenium* by their habits, and the more compound structure of the fronds as by the peculiarities of their sori. This combination of characters may readily be seen in the Lady fern, and as the athyrioid sori largely predominate in that species it has become the accepted type for *Athyrium*.

[1] The genus *Athyrium* was first published by Albrecht Wilhelm Roth in Tentamen Florae Germanicae, "which was published in three volumes extending from 1788 to 1800. The Ferns were published in Volume 3, which is dated 1800, but Pfeiffer cites 1797, and 1798 is sometimes given as the date when the genus was first proposed, that being the date of the Preface (Sept. 14). According to Dr. Underwood (see an excellent historical "Review of the Genera of Ferns," reprinted from Memoirs Torrey Botanical Club, 1899) Bernhardi quoted Roth's genera in 1799, which would indicate an earlier appearance than the date of the volume itself.

The name *Athyrium* is derived by Wittstein (*Etymologisch-botanisches Handwörterbuch*, 83) from ἀ privative and θυρεός, a shield, on the ground that Roth must have meant that the sorus having the indusium solely on one side, is in a sense without a shield. Lowe (Our Native Ferns, ii. p. 4) inclines to the belief that the name is from the Greek "Athyros — opened."

In addition to the characters mentioned, Dr. Milde laid much stress on the character of the fibro-vascular bundles in the stipe, and it is certain that in *A. filix-foemina*, at least, the two somewhat crescent-shaped bundles in the lower portion of the stipe are partially crooked at the upper ends and retain a partial resemblance to the hamate form of the sori, even after the bundles themselves become united in the upper portion of the stipe and rachis, into the single U-shaped form.

The genus is pretty generally accepted abroad at the present time, and has been adopted in this country by Shimek, Maxon, Clute and Gilbert in their recent publications. On this account I have decided, after mature deliberation, to adopt it myself, as this seems to be one of those instances where the general concensus of views among the best authorities should prevail. Accordingly the subject of the following note will be designated as *Athyrium filix-foemina*, instead of *Asplenium filix-foemina* as heretofore.

4. The Indusium of Athyrium filix-foemina, Roth (Tent. Fl. Ger., iii, 65). — During the early months of the present year (1901) I devoted a great deal of time to an examination of the early states of the sori in *Athyrium filix-foemina*, principally for the purpose of comparisons between the common forms of the Lady fern and the California plant known as *A. cyclosorum*, which has the margins of the indusia in their early states ciliated with jointed hairs (B. D. Gilbert).

The indusium of *A. filix-foemina* is variously described and figured by different authors whose descriptions and figures do not always agree. Generally the indusium is described as having a jagged or toothed margin fringed with cilia, even when the figures represent an entire, or nearly entire margin. These discrepancies are due to the great diversity in the character of the species itself, specimens of which vary according to their form or age. But according to the majority of descriptions the indusium has a lacerated and ciliated margin, and such a character is figured by good authorities as the type form for the species.

Yet during the months of May and June, I examined many hundreds of fronds in all stages of development without once finding any such type.

In the greater number of sori examined the margin of the indusium was either entire, or only very slightly erose, or sinuately notched, so

that it began to look as if some unusually extreme condition had been selected for the type form.

Finally, however, I began to find some ciliated indusia, and well into July both Miss Slosson and myself found lacerated and ciliated indusia in abundance. Thus contrary to my expectation of finding ciliated margins on the earliest fronds as appears to be the case with the California *cyclosorum*, they were not found until the later fronds of midsummer developed.

About the middle of July Miss Slosson sent to me from Mattapoisett some fresh specimens with a large percentage of ciliated indusia, but as I was unable at the time to give them an immediate examination the specimens were put under a loose pressure for temporary preservation, and when taken out later on were found to be apparently without cilia, the cilia having either dried up, or become rubbed off through pressure. This shows them to be extremely fugacious. It is certain also that when present in nature they gradually disappear as the sori mature, so that beyond a certain stage of development they are seldom seen. It is also certain that they occur more abundantly on some forms than on others, but I am convinced that so far as our New England forms are concerned they should not be figured as the type form for the species without at least some clearer explanations than are usually given.

The sori in *Athyrium filix-foemina* exhibit three well marked forms, the first being nearly straight or slightly curved on the back, as in true *Asplenium*; the second being partially recurved at one end like a Bishop's crook, and the third being wholly recurved like a horseshoe in shape. In the latter form the two ends approach each other so closely as to make the sorus appear reniform, as in *Nephrodium*, for which specimens have sometimes been mistaken. In some of the more delicate small field and woodland forms the small roundish matured sori look so much like those of *Phegopteris* that specimens are often very puzzling to novices, but a little attention to the cutting of the frond, and the venation, will soon overcome the difficulty. There is, too, an indefinable charm about the various forms of the Lady fern which soon enables one to know it from its peculiarly graceful motion by merely gently swaying a frond in the hand.

In all three forms of the sori the indusium may be either entire, sinuated, toothed or jagged, and either with or without the hairlike projections called *cilia*, which gradually disappear with age.

The different forms of the sori are technically designated as first, *linear*, or straight (*asplenioid*); second *hamate*, i. e., like a Bishop's crook, or staff, and third *hippocrepiform*, in shape like a horseshoe, the two latter forms being *athyrioid* in character.

All three of these forms occur in greater or less proportions on the same plant, and even on the same frond, but the hamate and hippocrepiform sori occur in greater proportion on some forms than on others, and it was the preponderance of such forms that led Roth to found the genus.

From all this it will be seen that *Athyrium* is chiefly characterized by the production of *hamate* and *hippocrepiform* sori, and that *Athyrium filix-foemina* is its best type.

The only other member of the genus in New England is *Athyrium thelypteroides*, Desvaux, which may be the subject of another note later on.

Medford, Massachusetts.

THE NORTH AMERICAN EUPHRASIAS.

B. L. Robinson.

It has long been recognized by New England botanists that the attractive little Eyebrights of our northern borders present much more diversity than is indicated in current floras. The appearance of Prof. von Wettstein's elaborate monograph of the genus Euphrasia, published in 1896, was, therefore, a matter of much interest and many efforts have been made to bring our forms under the species of the New and Old World therein so carefully described. However, the results have been only partially successful. It is true that the separation of *E. latifolia* of arctic America and the specific distinction of the diminutive *E. Oakesii* of the White Mountains have given some relief to the traditional and overcrowded *E. officinalis*, but even with the addition of *E. americana*, Wettst. and the later *E. canadensis*, Townsend, it has still been impossible to find satisfactory categories for several of our forms. This has arisen from no lack of clearness in the detailed descriptions and excellent key of the monograph but from the evident fact that its author, while able to examine a great

wealth of Old World material was obliged to draw his inferences regarding the American species from comparatively few and inadequate specimens. During last August the writer in company with Mr. E. F. Williams was able to secure on Mt. Washington specimens of the alpine forms there represented and these together with excellent material from the St. John valley in northern Maine, some very interesting forms from Mt. Desert Island secured by E. L. Rand, Esq., and the miscellaneous specimens which have long been accumulating in the Gray Herbarium, have seemed to warrant the present attempt to coördinate our American forms. It must be confessed, however, that the present restricted range of several species, the nearness of others to Old World forms, and the difficulty of clearly delimiting the arctic species, all suggest the probability that considerable further collecting and observation will be necessary before a definite settlement of the group can be attained.

According to Wettstein's treatment the genus Euphrasia contains about 90 species, of which 19 are Australian, 14 South American, and the remainder of the northern temperate and arctic zones, occurring chiefly in mountainous and boreal regions. Wettstein regards the following species as exclusively American : *E. Oakesii* and *E. americana*, to which may be added the later published *E. canadensis*, Townsend,—while *E. latifolia*, and *E. mollis* are treated in the monograph as common to certain portions of both continents. The possible occurrence of *E. hirtella* in America as merely conjectured. All these species are annuals and belong to Wettstein's first series, the *Parviflorae*, which includes also the majority of the rather numerous and difficult species of central Europe and the British Isles.

Synopsis of Species.

* Flowers very small, borne in a compact leafy head or very short dense subcapitate raceme : dwarf arctic and alpine species with stems normally simple : corolla dorsally 3 to 4 mm. long.

+ Leaves gray pubescent beneath.

++ Calyx-teeth straight or nearly so : flowers shortly racemose : Alaskan.

E. MOLLIS, Wettstein, Monog. d. Gatt. Euphrasia, 141 t. 4, f. 205–210, t. 12, f. 5 (1896). *E. officinalis*, var. *mollis*, Ledeb. Fl. Ross. iii. 263 (1849). Leaves gray-hirsute upon both surfaces, especially upon the nerves beneath, the lower ovate, deeply crenate-toothed,

the upper and floral suborbicular with obtuse, obtusish, or scarcely acute teeth: calyx-teeth rather broad, flat, subacute, densely pubescent: corolla very small, white or purple with deeper-colored veins.— Alaska, the Aleutian Ids., and Kamtchatka acc. to Wettstein. To this species may be referred Mr. J. M. Macoun's no. 154 from Behring Isl. The species seems difficult to separate satisfactorily from *E. latifolia*, Pursh. The latter, however, is less hirsute, often glandular, more inclined to branch, and has slightly larger flowers.

+ + Calyx-teeth recurved: flowers capitate: corolla white with violet veins and yellow eye: White Mountains of New Hampshire, and (?) Mt. Katahdin, Maine.

E. OAKESII, Wettst. l. c. 142, t. 4, f 211 to 215, t. 12, f 6, & in Bot. Gaz. xxii. 401; Britton & Brown, Illust. Fl. iii. 182, f. 3327 (excellent). *E. officinalis*, var. *tatarica*, Wats. & Coult. in Gray, Man. ed. 6, 392, in part. Very dwarf, 2 to 5 cm. high, the filiform erect or often decumbent simple stem bearing 1 to 4 pairs of small ovate-orbicular leaves below the dense globular leafy inflorescence (about 1 cm. in diameter): leaves and bracts finely pubescent upon both surfaces, the teeth 5 to 9, very blunt and separated by rounded sinuses: calyx pubescent, the teeth slightly indurated, curved outward in varying degrees or even reflexed: corolla so small as to be inconspicuous even in anthesis, nearly or quite white, marked with deep bluish violet veins and yellow eye.— Alpine region of the White Mountains, *Oakes*; *W. H. Manning*, 9 Aug. 1881; along the Crawford trail, near the head of Oakes Gulf and Mt. Munroe, 28 Aug. 1877, and 18 Sept. 1891, *E. Faxon*, 20 Aug. 1891, 31 July, 1893, *G. G. Kennedy*, also in the same locality, 4 Aug. 1901, *E. F. Williams & B. L. Robinson*. Growing in abundance in dry stony soil with *Potentilla frigida*, etc. While it is not possible to say with certainty that the locality particularly mentioned, which is on the western side of Mt. Washington toward Mt. Monroe is the one in which the original material was obtained by Oakes, it is now the only locality where this plant is known to grow in the White Mountains and it is altogether likely that it is the type station. Immature and doubtful plants apparently of this species were collected on Mt. Katahdin, altitude 1225 to 1375 m., 14 July, 1900, by M. L. Fernald (RHODORA, iii. 176).

+ + Leaves more or less ciliolate and minutely setulose upon the upper surface near the margin (under a lens), otherwise essentially glabrous: corolla brownish purple with a yellow eye.

E. Williamsii. Dwarf, 3 to 10 cm. high; stem erect, simple, filiform, purplish, covered with short crisped white hairs and bearing beneath the terminal dense leafy head 3 to 5 pairs of leaves: leaves green with slight bronze tinge above, 5 to 8 mm. long, ciliolate, otherwise essentially glabrous, the lowest ovate-oblong, 7-toothed,

the middle somewhat larger, ovate, the floral obovate to flabelliform or suborbicular, closely approximated in a dense head; teeth 7 to 9, short, triangular, acutish, the terminal tooth of each floral leaf broader and more obtuse but mucronulate; the sinuses acute or at least not conspicuously rounded: flowers very small, confined to the terminal subglobose head and one or two of the upper axils just beneath it: calyx 4 mm. long, the teeth lanceolate, ciliolate with very short and inconspicuous hairs and terminating in a narrow somewhat uncinate point: corolla brownish purple, 3.5 to 4 mm. long dorsally, its pubescence minute and visible only with a strong lens; lips about equal in length, the lower paler in color and internally marked by a small yellow eye: capsule elliptical, ciliate toward the obcordate summit, otherwise glabrous.— Eastern slopes of Mt. Washington, New Hampshire, alpine region, stony ground and crevices of rock on the "Alpine Garden" at the head of Raymond's Ravine and of Huntington Ravine, 5 Aug. 1901, *E. F. Williams & B. L. Robinson* (type); ledges near the 5th mile post on the spur known as "Cape Horn," 6 Aug. 1896, *E. Faxon & E. F. Williams*; at the same locality 6 Aug. 1901, *E. F. Williams & B. L. Robinson.*

This species possesses a close habital similarity to the preceding and in the dried state might easily be confused with it, unless the very different pubescence were noticed. In a fresh state, however, the deep brownish purple corolla and greener foliage readily distinguish it from *E. Oakesii.* There are also minor differences in the sinuses between the teeth of the leaves, smoother less uncinate calyx-teeth, etc. Mr. Williams and the author examined about six hundred individuals of this species and more than a thousand of *E. Oakesii*, but could detect no intermediates.

* * Flowers very small (corolla 3 to 4 mm. long), borne in long open racemes; stems simple or few-branched: leaves small, bluntly toothed, pubescent on the veins beneath.

E. Randii. Simple or few-branched from near the base or (rarely) much branched throughout, erect or decumbent, 3 to 12 cm. high; stem purple, covered with very short recurved white hairs and bearing 10 to 13 pairs of leaves (separated by short internodes of nearly uniform length) and a small terminal dense leafy head: leaves suborbicular, 9–11-toothed, the larger 7 to 9 mm. long, broadly subcordate, finely subappressed pubescent upon the dark green rugose upper surface, setulose upon the prominent veins of the paler lower surface, the teeth obtuse or barely acute, not aristate, all pairs of leaves, except one or two of the lowest floriferous in one or both axils: flowers small, subsessile: calyx pubescent, 3.5 mm. long; the teeth triangular, lanceolate, flattish and nearly or quite straight, finely pubescent upon both surfaces: corolla cream-colored with reddish veins to deep purple or violet, marked with still deeper veins, greenish toward the base, nearly glabrous; lips short, about equal:

capsule elliptic-oblong, ciliate and obcordate at the summit.— Grassy and sedgy places on Mt. Desert Island, Maine, and the smaller islands adjacent, as follows: Great Cranberry Isle, 17 July, 1897, *E. L. Rand* (types, in hb. Gray and hb. E. L. Rand), 17 July, 1896, *E. L. Rand*, 20 July, 1899, *E. L. Rand & E. F. Williams*; Mt. Desert Isl., on the "Sea Wall," 26 July, 1892, *E. L. Rand*; Baker Isl., 22 July, 1899, 22 July, 1901, *E. L. Rand*; Great Duck Isl., 12 July, 1901, *E. L. Rand*; near seashore, Cutler, Maine, 13 July, 1901, *G. G. Kennedy*.

This species differs from *E. Oakesii* in its greater stature, tendency to branch, broader and straightish calyx-teeth, apparently deeper colored corolla, and especially in the open spicate raceme, which begins from the second or third node and is much elongated even during anthesis. In *E. Oakesii* on the contrary the inflorescence remains capitate even to ripe fruit. *E. Randii* differs from *E. Williamsii* similarly in inflorescence and also in its much more copious pubescence. It appears to stand close to *E. micrantha*, Brenn. of Lapland, which, however, is said to have a glabrate calyx and white corolla with dark veins.

Var. (?) **Farlowii**. Leaves smaller, 2 to 4 mm. long, thicker, only 5–7-toothed: pubescence coarser and more spreading. — Dog Island, Eastport, Maine, September, 1877, *W. G. Farlow*. This is a puzzling form which more copious material may show to be a distinct species.

* * * Flowers larger: corolla dorsally 5 to 7 mm. long, white with bluish purple or violet veins and yellow eye.

+ Leaves conspicuously pubescent, glandular hairs being often interspersed with the non-glandular; teeth obtuse to acute (in the upper and floral), not at all aristate or scarcely so.

E. latifolia, Pursh, Fl. Am. Sept., ii. 430 (1814); Wettst. Monog. 136, 298, t. 4, f. 194–199, t. 11, f. 11. 12; not Willd.; *E. officinalis*, var. *latifolia*, Britton, Mem. Torr. Club, v. 296 (1894), and *E. latifolia* Britton & Brown, Illust. Fl. iii. 181, 182 (but fig. 3325 uncharacteristic and name contrary to the Rochester Code); *E. officinalis*, var. *tatarica*, Benth. in DC. Prodr. x. 552, in part. — Dwarf or rarely tall, 4 to 12 (or more) cm. high: foliar leaves 2 to 4 pairs, broadly ovate, obtuse and with 2 to 5 bluntish teeth on each side, pubescent with (for the genus) rather long although often sparse non-glandular hairs; floral leaves larger, more deeply and sharply toothed but not aristate, commonly glandular as well as covered by a rather copious non-glandular pubescence, not plicate even in dried specimens: flowers closely aggregated at the ends of the stem, but the inflorescence at length becoming lax below.— Northern Maine, upper St. John valley, *G. L. Goodale*. Labrador, Hopedale, Bowdoin Coll. Exped. no. 242, also *J. D. Sornborger*, no. 82; Rama, *A. Stecker*, no. 343; also Alaska, Kamtchatka, and Lapland, *Andersson*.

E. HIRTELLA, Jordan in Reuter, Compt. Rend. Soc. Haller. iv. 120 (1854–1856), acc. to Wettst. Monog. 175, t. 4, f. 278–290, t. 8, f. 4–7. — Very similar to the preceding but less arctic in habitat and less dwarfed in habit, 5 to 18 cm. high, often branched: stem-leaves ovate-oblong, cuneate, obtusely toothed; bracts ovate, very sharply or acuminately 5–8-toothed on each side, narrower and less imbricated than in the preceding, strongly pubescent and glandular: calyx, corolla, and capsule much as in the preceding. — North shore of Lake Superior, 1848, *L. Agassiz*, 1879, *T. S. Roberts*; Isle Royal, 1849, *Whitney*; Good Harbor, Minnesota, 14 August, 1868, *H. Gillman*; Hudson Bay, *Burke*; Rocky Mountains of British America, *Drummond.*

While Wettstein credits this species to America doubtfully and only upon the basis of some mixed material in the herbarium of the Royal Gardens at Berlin, there can be little doubt of the entire correctness of his view for the specimens above cited agree well not only with descriptions and figures of *E. hirtella* but also with Old World specimens of it.

On page 191 of his monograph Wettstein cites *E. Rostkoviana*, Hayne, as examined from Quebec (*Canby*), but as this occurrence is not mentioned in his later list of American species (Bot. Gaz. xxii. 401), it is probable that it rested upon a determination which was doubted or latered in the interim. The writer has seen no plant from any part of America which combined the large corolla and copious pubescence which are together characteristic of *E. Rostkoviana.*

+ + Leaves glabrous or bearing only some very minute hairs at the margin and on the veins beneath, the floral bracts often minutely glandular-puberulent.

E. AMERICANA, Wettst. Monog. 127 (1896); Bot. Gaz. xxii. 401. — Rather tall, considerably branched above, the stem covered with fine short crisped reflexed white hairs, the branches elongating into rather loose spicate-racemose inflorescences: lower and middle leaves ovate or ovate-oblong, not strongly plicate, 3–5-toothed on each side, the upper teeth obtuse, the lower acute, becoming in the upper and floral leaves very sharp and decidedly aristate at the tip; more or less fine glandular puberulence often present: corolla 5 to 6 mm. long dorsally. — QUEBEC, *Canby*, acc. to Wettstein: NOVA SCOTIA, Cape Breton Isl., *W. Faxon*: NEW BRUNSWICK, St. John, *Matthew*, acc. to Wettstein; Lily Lake, St. John, 8 August, 1873, *Wm. Boott*; Campobello, September, 1898, *W. G. Farlow*: MAINE, Machias, *J. W. Chickering*; Machiasport, *M. A. Barber*; mossy roadside in woods, Cutler, 16 July, 1901, *G. G. Kennedy*; Mt. Desert Isl., Southwest Harbor, 15 Aug., 1888, 30 Aug., 1890, 28 Aug., 1891, 26 July, 1892, *E. L. Rand*; 19 Sept., 1892, *M. L. Fernald*; Great Cranberry Isle., 20 Aug., 1888, 18 July, 1894, 17 July, 1896, 17 July, 1897, 16 July,

1898, *E. L. Rand*; 10 July, 1894, *E. Faxon*; 7 July, 1890, *J. H. Redfield*, *E. F. Williams*; 20 July, 1899, *E. F. Williams*; Black Isl., 20 July, 1894, *J. H. Redfield.* These plants of Mt. Desert are in many instances tall forms, growing in long grass, branching above, and with inflorescences at first short-cylindric and compact but at length loose and considerably elongated. Complete transitions may be found to the following variety or form growing in short grass or in drier and more sterile places.

Var. **canadensis**. *E. canadensis*, Townsend, Journ. Bot. xxvii, 1, t. 381 (1898).— Closely similar in foliage and flowers: stem low, branched from near the base, densely floriferous from considerably below the middle: floral bracts sometimes with and sometimes destitute of minute glandular pubescence.— QUEBEC, on grassy hills near the city, 1891, *F. Townsend*; Plains of Abraham, *J. Blake*: Ha Ha Bay, *G. G. Kennedy*: MAINE, in short grass, Frenchville, 12 Aug., 1901, *E. F. Williams, M. L. Fernald & B. L. Robinson*; Great Duck Isl., 9 Aug., 1893, *J. H. Redfield*, 12 July, 1901, *E. L. Rand*; Baker Isl., 22 July, 1901, *E. L. Rand*; NEW HAMPSHIRE, White Mountains, at lower altitudes, Glen House, 28 July, 1865, *Wm. Boott*; 18 July, 1891, *G. G. Kennedy*; roadsides at base of Mt. Washington 10 Aug., 1878, *J. A. Allen.* The White Mountain plants are slender forms of sterile soil.

GRAY HERBARIUM.

SOLANUM ROSTRATUM IN CENTRAL MAINE.— I note that all published records of the occurrence of *Solanum rostratum* Dunal in this State are from the other side of the Kennebec River, or at least I have seen no record of its occurrence nearer than Gardiner. To-day (Sept. 22, 1901) I collected specimens of this species in the rear of some farm buildings a short distance out of Bangor. This species seems to be becoming established throughout the State as it has spread widely since first found in 1896.

I have in my collection at present a fragment of a specimen which was sent to the University of Maine for identification in Sept., 1896, by Mr. C. C. Call of Buxton. I feel sure this was the first instance of its occurrence in the State being known, and record was made at the time by the late Prof. Harvey.— O. W. KNIGHT, Bangor, Maine.

TREE WILLOWS AT FORT KENT, MAINE.

EMILE F. WILLIAMS.

THE St. John river, where it forms the northernmost boundary of Maine between St. Francis and Hamlin, has already been most prolific in botanical rarities, but that its resources are by no means exhausted was demonstrated very forcibly during the short botanical trip made there last August by Dr. B. L. Robinson,[1] Mr. M. L. Fernald and myself. Many most interesting plants were collected and these will be noticed in due time in this journal, but I wish in this instance to call attention to some remarkable willows which we found growing in a hillside bog at Fort Kent.

Salix discolor assumed here the habit and proportions of a fair sized tree. The trunk of one specimen measured forty-three inches in circumference at two feet from the ground. *S. balsamifera*, which I believe has always been considered a shrub, here attained a diameter of fourteen inches at two feet from the base. Like *S. discolor* it assumed a tree-like habit and both these species were represented by specimens not less than twenty to twenty-five feet high. Another willow proves to be of more than usual interest. I collected specimens from a tree measuring seventeen inches in circumference at two feet from the ground and not less than twenty-five feet high on July 22nd, 1900, with Mr. J. Franklin Collins of Brown University. We referred these last winter to *S. pentandra* of Europe and northern Asia, but rather doubtfully as the station where they were collected hardly seemed likely to harbor introduced species. We paid a visit to these trees on August 10th, 1901, and collected more material which has been critically examined by Mr. Fernald, who pronounces it to be *S. lucida*, Muhl., var. *macrophylla*, Andersson.

Andersson described this variety in his monograph of Salix (DC., Prodromus, XVI, Part 2, 205) from a specimen of Lyall's, collected in 1859 on the Frazer river (British Columbia) and from a specimen of Bourgeau's from Rio River (presumably in the Saskatchewan country). Fortunately there is a good full specimen of Lyall's in the Gray Herbarium and it matches exactly our material.

The important characters separating it from the ordinary *S. lucida*, in which the leaves when mature are quite glabrous, are the closely pubescent branchlets with an only occasional tendency to become

smooth and the very large taper-pointed leaves with the midrib pubescent both above and below, usually densely so even in late summer. Many leaves in my specimens are over six inches long.

Thus one more high northern plant is added to the Flora of the United States by its occurrence in the valley of the St. John river within our border.

Boston, Massachusetts.

A New Station for Lactuca Morssii. — Among a number of specimens of *Lactuca leucophaea*, Gray, which I collected in Middleboro, Mass., on Aug. 18, 1901, there was one which, on examination, proved to have fruit unlike that of the others. This specimen has been identified at the Gray Herbarium as *L. Morssii*, Robinson. The plants came from a rather low place by the roadside, near a brook. Except for the fruit, there was no apparent difference between the species. This station extends the range of *L. Morssii* by about twenty miles, and is at least ten miles from the nearest salt water. — John Murdoch, Jr., Roxbury, Massachusetts.

THE TRUE LYCOPODIUM COMPLANATUM AND ITS COMMON AMERICAN REPRESENTATIVE.

M. L. Fernald.

In August, 1901, while studying the forms of *Lycopodium sabinaefolium* and *sitchense* on a northern hillside at Fort Kent, Maine, Mr. E. F. Williams called the attention of Dr. B. L. Robinson and the writer to a peculiar coarse plant with more or less glaucous branches. This plant which at first sight suggested a large glaucous form of *L. sabinaefolium* was seen upon examination to differ strikingly from that species in its broad branches with flat under surface. In this character the plant was like the common *L. complanatum* of the Eastern States. But unlike the well-known eastern *L. complanatum*, which occurred near by, the coarser glaucous plant quite lacked the compact fan-like habit of the sterile branches, while the longer loosely ascending branches were less forked, and the shorter mostly simple peduncles bore solitary simple or slightly forked strobiles

whose lowermost scales were often remote, grading imperceptibly into the scales of the peduncle.

Later, in September, the writer found in spruce woods at Island Falls (about ninety miles south of Fort Kent) a much larger development of the loosely branching plant. Here, however, the very long and loose branches were dark green and not glaucous; but, otherwise, in its broad, elongated, slightly forking branches and solitary or paired strobiles the Island Falls plant was undoubtedly to be identified with the more glaucous material from Fort Kent.

A comparison of the Maine specimens shows this plant to be of broad range in North America — from Newfoundland and Labrador to Alaska, south to the Great Lakes and the Rocky Mountains. This, as shown by the specimens then cited, is the plant described, without name, in 1900 by Lloyd and Underwood as a peculiar northwestern form of *L. complanatum*; while as the typical form of the species was cited the common eastern plant with "regular compact fan-like habit." They found, "however, at present only insufficient reasons for giving distinct specific rank to these plants," and, furthermore, that "*L. complanatum*, as it grows in Scandinavia, seems to parallel the northwestern condition of the American plant."

As represented in the Gray Herbarium the Scandinavian material of *Lycopodium complanatum* is not alone in resembling the "northwestern condition of the American plant." In fact, all the European and most of the Asiatic specimens examined are inseparable from the loosely branched plant found in northern Maine and described by Lloyd and Underwood from the northwest. This is the plant generally accepted by European authors as *Lycopodium complanatum* and it is well illustrated in Flora Danica, xv. t. 2671, and Journal of Botany, xx. t. 233. In fact, none of the Old World material examined (with the possible exception of a doubtful plant from Sachalin) shows the "compact fan-like habit" of the common plant of eastern America. In the European material the number of strobiles varies from 1 to 5, but peduncles bearing 1 or 2 occur most frequently. Of 208 peduncles examined 92 have 1 strobile, 88 have 2, 22 have 3, 5 have 4, and 1 has 5, with an average of 1.7 strobiles for each peduncle.

The *Lycopodium complanatum* of Linnaeus was a complex. The descriptive phrase in the Species Plantarum "spicis *geminis* pedunculatis" and the first cited references, to Flora Lapponica and Flora Suecica, show very definitely that he had in mind the common plant

of northern Europe. The last plant cited by him, however, the "Lycopodium digitatum foliis Arboris Vitae, spicis *bigemellis* teretibus" of Dillenius, was the common plant of eastern America, as is shown very clearly by the plate of Dillenius drawn from a Pennsylvania specimen collected by John Bartram. This citation (at the last of his description) is the only reference to an American plant given by Linnaeus. That he could not have intended this as the primary constituent of *L. complanatum*, is shown not only by the preceding references to the European plant, but, furthermore, by his own descriptive phrase (in the uncompiled portion of the description) "spicis geminis." For while the common plant of Europe and extreme northern America has oftenest 2 (1 to 3) strobiles (spikes), the Alleghanian plant with "compact fan-like habit" usually has 4. Of the 88 peduncles of this form examined, 1 has 2 strobiles, 18 have 3, 65 have 4, 3 have 5, and 1 has 6, with an average of 4 strobiles, the "Lycopodium digitatum . . . . spicis *bigemellis*" of Dillenius.

These two forms of the species may be distinguished as follows:

L. COMPLANATUM, L. Branches with loosely and irregularly ascending branchlets very flat on the lower surface, 2 to 4 mm. wide, 0.5 to 1.2 dm. long, remotely forked, the simple terminal divisions much elongated, mostly 4 to 10 cm. long: peduncles 0.5 to 8 (average 3) cm. long, with 1 to 3 (very rarely more) strobiles.— Spec. ii. 1104 (excl. pl. Dill.); Druce, Jour. Bot. xx. 321, t. 233; Fl. Dan. xv. t. 2671. *L. complanatum*, form, Lloyd & Underwood, Bull. Torr. Club, xxvii. 164.— Northern Europe and Asia. In America from Exploits River, NEWFOUNDLAND (*Robinson & Schrenk*) and Davis Inlet, LABRADOR (*Sornborger*, no. 56x.) to Lake Lindeman, ALASKA (*Schwatka*, no. 21); south to Bald Head, Tobique River, NEW BRUNSWICK (*Hay*, no. 86), Grand Falls (*Robinson & Fernald*); Fort Kent, MAINE (*Williams, Robinson, & Fernald*), Island Falls (*Fernald*); upper Flathead River, MONTANA (*Canby*, no. 399); Lake Pend d'Oreille, IDAHO (*Heller*, no. 770). Occasional forms have the peduncle reduced or quite wanting, when the plant approaches *L. alpinum*. Such specimens may usually be distinguished from that species by the coarser and looser habit, broader and flatter branches, and longer strobiles.

Var. **flabelliforme**. Branches mostly spreading or recurved, flabelliform, 2.5 to 7 cm. long, the branchlets 1.5 to 3 mm. broad,

much forked, the simple terminal divisions 0.5 to 4 (average 2) cm. long: peduncles 3.5 to 10 (average 6.8) cm. long, with 1 to 6 (usually 4) strobiles. — *Lycopodium digitatum foliis Arboris Vitae, spicis bigemellis teretibus*, Dill. Hist. Musc. 448, t. 59. *L. complanatum*, L., l. c. (as to pl. Dill.), American authors and European authors, in part; Lloyd, Bull. Torr. Club, xxvi. 565; Lloyd & Underw. l. c. — MAINE, Island Falls, Sept. 26, 1901, Dover, July 17, 1896 (*M. L. Fernald*); Beech Hill, Mt. Desert Island, July 27, 1899 (*E. F. Williams*): NEW HAMPSHIRE, Jaffrey, July 9, 1897 (*B. L. Robinson*, no. 187): VERMONT, Manchester, July 16, 1898 (*M. A. Day*, no. 219): MASSACHUSETTS, Mt. Wachusett, Sept. 1896 (*W. W. Bailey*); Concord, Sept. 30, 1879 (*W. P. Rich*); North Reading, Sept. 4, 1882 (*C. E. Perkins*); Malden, Aug. 1878 (*H. A. Young*); Blue Hills Reservation, Sept. 11, 1898 (*F. G. Floyd*); Douglass, Oct. 25, 1893 (*J. F. Collins*): CONNECTICUT, Southington, Sept. 18, 1898 (*L. Andrews*, no. 494); reported from Nova Scotia to Ontario, Minnesota, and West Virginia.

GRAY HERBARIUM.

THE HERBARIA OF NEW ENGLAND.

MARY A. DAY.

(Continued from page 262.)

Seymour, Arthur Bliss, WAVERLY, MASSACHUSETTS.— The phaenogams in Mr. Seymour's herbarium are kept at his home in Waverly and number about 3500 specimens, including nearly 2500 species with a geographical range covering nearly all the United States. The cryptogams in this collection number about 3500 species and are deposited in the rooms of the Cambridge Botanical Supply Company. The group of *Fungi* is best represented, being specially strong in the *Uredineae*, *Ustilagineae*, and *Erysipheae*, including specimens from different parts of the United States, Europe, Japan, and South Africa.

Smith College, NORTHAMPTON, MASSACHUSETTS.— In the herbarium at Smith College are about 6600 sheets nearly half of which are cryptogams. The cryptogamic part consists largely of purchased

sets of *Algae*, *Lichens*, and *Fungi*. The phaenogams are, in a great part, gifts of persons interested in the college and are from all parts of the world. The collection has been in existence twelve or thirteen years, and is now in charge of Professor W. F. Ganong.

South Natick Historical, Natural History and Library Society, South Natick, Massachusetts. — This society possesses a large number of plants which once belonged to Dr. J. W. Robbins of Uxbridge, Prof. J. L. Russell of Salem, Judge Clinton of Buffalo, and others including a collection of ferns from South India, Africa (Mountains of the Moon), Sandwich Islands, South America, etc., They are at present in the care of a botanist who is engaged in the work of mounting and classifying them with the purpose of rendering them available for reference.

Springfield Botanical Society, Springfield, Massachusetts. — The plants in this collection, numbering about 1000 specimens, are nearly all from the region around Springfield. Mrs. M. L. Owen has, however, contributed to it all her rarer plants of Nantucket, and it includes some of M. S. Bebb's willows and L. H. Bailey's *Carices*.

Sturtevant, Edward Lewis. Dr. Sturtevant made his collections along special lines, and it consisted very largely of cultivated plants. In the Garden Herbarium of Cornell University are his collections of *Cucurbitae* and the genus *Taraxacum*, also the material on which he founded his monograph of garden beans. Much of this collection now in possession of Cornell University consists of manuscript notes, extensive clippings, tracings of old drawings, and original paintings by his daughter. He gave his specimens of *Capsicum* to the Missouri Botanical Garden, but his collection of corn has been nearly if not entirely destroyed.

Sullivant, William Starling, see Harvard University, Cryptogamic Herbarium.

Swan, Charles Walter, Brookline, Massachusetts.— Dr. Swan's herbarium, consisting largely of phaenogams, contains 6400 sheets, representing 134 orders, and 902 genera. It has been collected during the past twenty years by exchange, purchase, and field work. A few hundred sheets represent foreign plants, 700 Canadian plants especially of the Rocky Mountains and the northwest, but the larger number contain plants of the United States, New England especially eastern Massachusetts claiming a majority of the specimens. The orders are arranged alphabetically and the genera under the

orders in the same way. Interest has been centered about the rushes, sedges, and grasses; 102 sheets represent the *Juncaceae*, 778 the *Cyperaceae* (of which 80 are *Cyperus* and 558 are *Carex*), and 1017 the *Gramineae*. Some of the other orders are represented as follows; *Compositae*, 691 sheets; *Filices*, 315 sheets; *Leguminosae*, 269 sheets; *Rosaceae*, 188 sheets; *Scrophulariaceae*, 159 sheets; *Labiatae*, 131 sheets; *Naiadaceae*, 122 sheets of which 109 are Potamogetons mostly purchased from Dr. Thomas Morong.

Taylor, Thomas, see Harvard University, Cryptogamic Herbarium.

Terry, Emily Hitchcock, NORTHAMPTON, MASSACHUSETTS.— Mrs. Terry's herbarium contains about 1600 specimens of flowering plants and ferns, and has been collected during the last fifteen years. The most important part is the collection of ferns, which represents all the species, with one exception, which are described in Gray's Manual, also many of more recent discovery. In addition Mrs. Terry has specimens of ferns from western and southern United States, the West Indies, Bermuda, Labrador, Iceland, Japan, India and the Hawaiian Islands.

Thoreau, Henry David.— At his decease Henry D. Thoreau bequeathed to the Boston Society of Natural history his herbarium excluding the *Carices*. The latter he gave to Mr. Edwin S. Hoar of Concord, Mass. After some years the Boston Society of Natural History gave the part in their possession to the town of Concord and it is now deposited in the Public Library. It consists of six large sized folios of about 100 sheets each, several specimens being mounted upon one sheet. The plants, which are arranged systematically have no labels, the names being written on the sheets often without further data, and sometimes with a pencil. Some Maine plants are included but Concord and its vicinity have the largest representation. In a written catalogue 750 species and varieties are recorded.

EDITORIAL.

Two botanical journals have expressed surprise at the publication in our advertising pages of the Bangor and Aroostook notice. They have done so upon the not unnatural supposition that the plants

therein mentioned were being endangered by the publicity given to their haunts. We are glad to say, however, that the advertisement was cautiously drawn and, while giving an excellent idea of the richness of the Aroostook flora, assigns stations to no plant which is not to be found in quantities to supply the herbaria of the world without the smallest danger of extermination. To illustrate it may be said that the elsewhere infrequent *Aster Lindleyanus* is the prevalent Aster in some parts of northern Maine where it is actually fought as a weed by farmers. *Halenia deflexa*, known from but one station in Vermont and not yet collected in New Hampshire, is common and abundant through much of Aroostook County. The interesting *Oxytropis campestris*, var. *johannensis* covers the gravelly banks and shoals of the St. John river for many miles. The dwarf mistletoe, one of very few plants to which the advertisement assigns a precise station, is, notwithstanding its botanical interest, a timber pest, present in all too great abundance. *Drosera linearis*, elsewhere unknown east of Lake Superior, is widely distributed on "Caribou Bog" which is thirty miles long and ten miles wide. Did space permit, the other species mentioned in the advertisement could likewise be shown, through their abundance or wide diffusion in northern Maine, to be in no danger whatever. From the examples already given it will be clear that any comparison between such lingering survivals as Camptosorus in densely settled regions or near popular resorts on the one hand, and these plants luxuriating in 10,000 square miles of fertile plains, wide-reaching bogs, and pathless forests of sparsely settled northern Maine on the other, is purely specious — a matter of words not facts.

Considering the narrow limits within which the summer visitor now botanizes in certain classical collecting grounds on the White and Green Mountains, we can only express the hope that some part of the amateur collectors, who yearly visit these relatively restricted tracts of boreal and alpine flora, may through the influence of the advertisement be deflected to northern Maine, where, with a far greater opportunity to be of service to science, their collecting could have no serious influence upon the vegetation. Indeed, the flora of no other area east of the Rocky Mountains and south of British America seems to us less in need of concealment or special protection.

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HERBARIA OF NEW ENGLAND.

MARY A. DAY.

(Continued from page 283.)

Thurber, George, see Harvard University, Gray Herbarium.

Tuckerman, Edward. — Some years before his death Professor Tuckerman sent a part of his herbarium of phaenogams to the Academy at Upsala, Sweden. He retained however a portion as his own working herbarium, and this is now in possession of Mrs. Tuckerman at Amherst, Mass. Professor Tuckerman's large and valuable collection of Lichens was purchased in 1888 for the Cryptogamic Herbarium of Harvard University, where it is now preserved.

Tufts College, MEDFORD, MASSACHUSETTS. — The herbarium of Tufts College, in charge of Professor J. S. Kingsley, contains about 4000 sheets of plants. It is unorganized and at present inaccessible.

University of Maine, ORONO, MAINE. — The herbarium at this University, Professor W. M. Munson in charge, contains over 15000 species of both phaenogams and cryptogams, and includes the collection of the Rev. Joseph Blake. It is quite strong in *Compositae*, *Leguminosae*, and *Gramineae* and there is a good representation of *Musci*, Lichens, and *Algae*. In addition to the Ellis and Everhard sets there is quite a complete collection of Maine *Fungi* consisting of about 3600 species mostly collected by the late Prof. F. L. Harvey.

University of Vermont, BURLINGTON, VERMONT.—The beginnings of this herbarium were made about fifty years ago by Prof. Joseph Torrey of the University of Vermont. The collection has increased until at present it contains about 17000 specimens divided as follows:—*Fungi* (including Lichens) 6000 specimens; *Algae*, 3500 specimens; bryophytes, 700 specimens; pteridophytes, 1000 speci-

mens; spermatophytes, 5000 specimens; which are all mounted. Professor G. H. Perkins' herbarium is incorporated here, also a nearly complete set of Mr Pringle's Vermont collections and the more recent ones of Dr. A. J. Grout and W. W. Eggleston. During the last decade it has been the chief aim of the Curator, Professor L. R. Jones, to make this collection as completely representative of the Vermont flora as possible. It contains a large part of the material upon which Brainerd, Jones and Eggleston's Flora of Vermont was based.

Wellesley College, Wellesley, Massachusetts.—This herbarium has been especially developed in the line of cryptogams, and contains 11264 specimens representing about 8000 species. Of the phaenogams there are about 7000 specimens containing 3664 species. Among the important collections represented are the following: — Rabenhorst, Bryotheca Europaea; Warnstorf, Deutsche Laubmoose; Gottsche & Rabenhorst, Hepaticae Europaeae; Underwood & Cook, Hepaticae Americanae; Austin, Hepaticae Boreali-Americanae; Collins, Holden & Setchell, Phycotheca Boreali-Americana; Farlow, Anderson & Earle, Algae Exsiccatae Am. Bor.; A. H. Curtiss, Algae Floridanae; Ellis & Everhard, North American Fungi; Seymour & Earle, Economic Fungi; A. H. Curtiss, Plants of southern United States; Reverchon, Texan Plants; Patterson, Colorado Plants; G. E. Cooley, Alaskan Plants; Mig. Bang, Plantae Bolivianae; H. H. Rusby, Plants of South America; T. Morong, Plants of Paraguay, and many *Carices* from the Herbarium of William Boott This herbarium is in charge of Professor S. M. Hallowell and Professor C. E. Cummings.

Wesleyan University, Middletown, Connecticut.—The purchase of the Collection of Dr. Shurtleff in 1868 was the beginning of this herbarium, the only considerable addition which has since been made is the Joseph Barratt collection in 1879. It contains about 5000 species of plants which are nearly all phaenogams from New England, the grasses and sedges being better represented than any other orders. It is in the care of Professor H. W. Conn.

Wheeler, John Adams, Milford, New Hampshire. — Mr. Wheeler has a collection of about 4000 sheets of plants, including phaenogams and cryptogams, from all parts of the United States, acquired during the past six years. It contains plants from the herbaria of both Mr. Edward Tatnall of Wilmington, and Dr. A. W. Chapman of Florida.

Willey, Henry, New Bedford, Massachusetts. — The collection of Lichens formed by Mr. Willey during the last forty years contained several thousand specimens and was arranged by him systematically in two divisions. One division contained the Lichens of New Bedford, about 300 species with drawings, and the other the Lichens of other parts of the United States and foreign countries. These now are in possession of the U. S. National Museum, at Washington, D. C.

Williams, Emile Francis, Boston, Massachusetts. — Mr. Williams' herbarium contains about 40000 mounted specimens and is arranged systematically. The plants are mostly from New England, but New Jersey, eastern New York, and that part of Canada north of New England are included owing to their interest in connection with the New England flora. The plants of the White Mountains are specially well represented, Mr. Williams having collected every species known to grow above the timber line in this region. This herbarium is also intended to show the distribution of plants, therefore specimens from many localities in each state are preserved; the largest number of specimens are from Maine, New Hampshire, Vermont, and Eastern Massachusetts. Some of the collectors whose work is represented in this herbarium are Messrs. C. H. Bissell, E. Brainerd, W. Deane, E. H. Eames, W. W. Eggleston, E. & C. E. Faxon, M. L. Fernald, G. G. Kennedy and W. P. Rich.

Williams College, Williamstown, Massachusetts. — The herbarium at Williams College, Professor S. F. Clarke in charge, is a small one. It contains the herbarium of F. H. Bumstead, M. D., in which are specimens of ferns from the Wilkes Exploring Expedition, from D. C. Eaton and from Charles Wright. Here also are 23 volumes of plants which formed the herbarium of John Pierce Brace.

Yale University, New Haven, Connecticut. — The basis of this herbarium is the collection made by Professor D. C. Eaton, who commenced the work about 1850. During Professor Eaton's life the herbarium was his private property but after his death in 1896 it was given to Yale University by his son Dr. G. F. Eaton. It is estimated to contain 60000 specimens and well illustrates the North American flora but also contains many specimens from other parts of the world. The most famous part of this herbarium is the collection of ferns including Professor Eaton's types. The herbarium is now in charge of Dr. A. W. Evans.

Yale University, Forest School, New Haven, Connecticut. — During the last year a herbarium of woody plants has been started by Professor J. W. Toumey, and now contains about 3000 sheets, besides numerous specimens of fruits, bundles of twigs showing buds in winter condition, cones, etc. This collection of "box material" has been more developed than the regular herbarium.

Young, Aaron, see Bates College.

Young, Herbert Andrew, see New England Botanical Club.

Addenda.

Blomberg, Carl, North Easton, Massachusetts. — Mr. Blomberg's herbarium consists of 2450 sheets containing 1247 species of phaenogams and 90 species of cryptogams. The collection, which is mounted and arranged in systematic order, was started in 1889 and includes about 800 plants from Easton, Massachusetts, as well as many foreign and cultivated specimens.

Elwell, Levi Harry, Amherst, Massachusetts. In 1889 Professor Elwell began his collection of American plants which now numbers about 2500 sheets. To this he has added during the past year between 1000 and 2000 specimens, of his own collecting, from Greece and Italy. His herbarium contains nearly all the phaenogams and vascular cryptogams of Amherst and vicinity, besides many specimens from North Carolina, Florida, Kansas, Iowa, and British Columbia.

Correction.

The two herbaria, mentioned on pages 256 and 257 as belonging to Horace Mann and Horace Mann the younger, were formed by one and the same person, namely Horace Mann, Jr., son of the well-known educator of that name.

NOTES ON ALGAE, — IV.

F. S. Collins.

Spirulina Meneghiniana Zanardini, Atti R. I. Inst. Veneto, Vol. VI, p. 80, 1847. This species, hitherto found only as isolated filaments among other algae, was found July 27, 1901, on the Marblehead shore, Massachusetts, near Clifton station, in considerable quantity. It formed the principal constituent of a mixture in rock tide pools, above high water mark, but reached by spray in stormy weather. At the bottom of these pools was a light green impalpable sediment, like a chemical precipitate, the least motion of the water stirring it up so that great care had to be taken to secure it for specimens. The greater part of this sediment was *S. Meneghiniana*, characterized by the filaments, less than 2 μ diam. coiled in a loose spiral, 3–5 μ diam. *S. subsalsa* Oersted, the common species of this coast, has trichomes and spiral of about the same diameter as in *S. Meneghiniana*, but in the latter species the spiral is open, in the former the turns are nearly or quite in contact. See figures in Gomont, Monogr. des Oscill., p. 250, Pl. VII.

Cylindrospermum stagnale (Kuetz.) Born. and Flah., Revision des Nost. Het., part 4, p. 250, 1888. This plant formed a dense bluish-green or brownish scum on the surface of an artificial pond at the Pogy oil factory, Bristol, Maine, near Round Pond Village, July 16, 1901. Its cylindrical spores distinguish it from all our other species except *C. minutissimum* Collins, while the smaller size of the latter, in all its parts, prevents any confusion of the two. Of the five established species of this genus recognized in Bornet and Flahault, Revision, in 1888, only two were credited to America; but now all five are known to occur in New England, as well as *C. minutissimum*, described in 1896.

At Pemaquid Point, Maine, July 18, 1901, the writer found growing on sloping rocks, exposed to the full force of the surf, which is very heavy here, what appeared to be a dense growth of *Calothrix scopulorum* (Web. and Mohr) Ag., common in such stations. On examination by the microscope, however, the filaments were seen to have abundant pseudo-branches, showing it to be of the genus *Dichothrix*. Fresh water species of *Dichothrix* are not uncommon in New England, and in temperate countries generally, but there are only two marine

species known, both epiphytic, occurring in tropical or subtropical regions, and both quite distinct from the plant now under consideration. The nearest described species would seem to be *D. compacta* (Ag.) Born. and Flah., a fresh water plant of Scandinavia of smaller dimensions and different habit. It seems safe, therefore, to consider it as a new species, characterized as follows.

Dichothrix **rupicola** n. sp. Marine. Filaments forming a caespitose stratum, one mm. high, 15–22 μ diam., erect, penicillate, pseudobranched, ultimate branches flexuous-divaricate, acute. Sheath lamellate, yellow-brown, near the tip with dilated and lacerate ochreation. Trichomes aeruginous green to pale olive, 7–9 μ diam., terminating in a hair; length of articulations about equal to the diameter. Heterocysts basal. Forming a coating on sloping rocks, exposed to full force of the waves, Pemaquid Point, Maine, July 18, 1901.

Codiolum pusillum forma **Americanum** Foslie. The *Vaucheria pusilla* of Lyngbye was placed in the genus Codiolum by Foslie, Tromsø Mus. Aarshefter, Vol. X, p. 190, and is distinguished from the other species of this genus by the long stipe, slender throughout and much narrowed at the base, and by the cylindrical or subcylindrical "clava," the latter being from one half to two thirds the length of the stipe. In forma *Americanum* the clava is generally longer, sometimes equalling the stipe, otherwise the form is the same as the type.

The specimens collected grew on a rock, near high water mark at Marblehead, Mass., covering it with a continuous coating, in the manner of *C. longipes* Foslie, but not showing so distinct a mottled aspect in drying as the latter. On June 1, 1901, and at a subsequent visit June 15, young plants and germinating spores were found in abundance among mature plants, and some of the latter were forming spores, but none quite perfect were seen. Possibly the emission of spores took place at a different time of day from the time of collecting.

At Pemaquid Point, on the same exposed rocky slope where *Dichothrix rupicola* was found, there occurred in pools at about half tide level, an abundant growth of what appeared at first to be a Cladophora, similar to *C. refracta* Areschoug, but of denser growth and with slenderer branches. On dissection and microscopic examination it became evident that the plant was not like any species of Cladophora known on this coast, the branching being confined to the extreme base of each tuft, the upper part consisting of simple, crisped filaments, much like those of *Rhizoclonium tortuosum* Kuetz. The next suppo-

sition was that it might be *R. pachydermum* Kjellm., found in northern Europe and reported from Greenland by Rosenvinge, but a specimen sent to Dr. Rosenvinge was pronounced by him to be distinct from the Greenland plant. The branching seems to be more extensive than in any genuine Rhizoclonium, while the fact that it is confined to a small basal portion of the tuft, much the greater part being quite unbranched, distinguishes it from any species of Cladophora known to the writer. On the whole it seems best to place it provisionally in the former genus.

RHIZOCLONIUM (?) **erectum** n. sp. Forming erect tufts arising from prostrate filaments, 70–100 μ diam., of irregularly shaped, very thick-walled cells, 1–2 diam. long, from which arise branches either with a few similar branches at the base or simple throughout, 20–50 μ diam., usually 30 μ, cells 3–6 diam. long, branches up to 30 cm. long, but so much and regularly crisped and curled that the tufts seldom exceed 10 cm. in height. In tide pools, half tide to low water mark, Pemaquid Point, Maine, July 18, 1901.

Ascophyllum nodosum forma *scorpioides* (Fl. Dan.) Reinke, Atlas Deutscher Meeresalgen, p. 33. Though probably merely a form produced by the environment, of one of our commonest rock weeds, in its extreme condition it would hardly be recognized as at all connected. Besides the size being reduced everyway, the flattened frond of the type becomes nearly or quite terete, the forkings are more abundant, while the lateral branches are few or lacking; vesicles and fructification are wanting. It was found at Cape Rosier, Maine, July, 1901, forming a matted coating on mud between tide marks, among the stems of Spartina, etc.

Polysiphonia Schuebelerii Foslie, Christiania Vidensk.-Selsk. Forhand., p. 3, 1881. At Round Pond harbor, in the town of Bristol, Maine, July 14, 1901, the writer found extensive growths of *Zostera marina* near the mouth of the harbor, from low water mark to several meters depth. Several kinds of algae were growing on this *Zostera*, and at one place the predominant species over a considerable area was a four-tubed *Polysiphonia*, which appeared to be a delicate *P. violacea* (Roth) Grev. A few specimens were taken, but when examined with the microscope, the specific determination was seen to be wrong, and it was suspected that it was *P. Schuebelerii*, originally described from specimens from Finmark, and more fully described and figured by Rosenvinge, Grønlands Havalger, p. 799, fig. 2; Pl. I, figs. 1–2. A reference to Dr. Rosenvinge confirmed this im-

pression, giving an interesting addition to our flora. *P. violacea*, which it resembles in habit and in the extent of the cortication, has branches arising in the axils of the hairs; in *P. Schuebelerii* a branch arises in place of a hair. *P. Olneyi* Harv., the only other of our species for which it is liable to be mistaken, has little or no cortication, and a more decided tendency to dichotomous branching.

Spermothamnion Turneri (Mert.) Aresch. is one of the commonest algae of southern New England, sometimes being washed ashore in such quantities as to give its dark red color to water and beach for miles, but its only record north of Cape Cod is a reference by Harvey, Nereis Bor.-Am., part 2, p. 241; "var. variabile, Boston, Dr. Durkee." At Cohasset, Mass., Oct. 12, 1901, the writer found it washed ashore rather plentifully, though by no means in such abundance as had been seen at Newport, R. I., at Nantucket, or in other places. Var. *variable* Harv. (*Callithamnion variabile* Ag.) has been distinguished from the type by having the branching of the erect fronds, which arise from a creeping filament, secund or alternate; in the type this branching is chiefly opposite, but occasionally alternate. In the Cohasset specimens, while the predominant form was alternate or secund, it was not uncommon to find one and the same creeping filament producing some fronds with opposite branching, some with alternate, some chiefly secund. It would seem that the varietal name was hardly worth maintaining.

Of the species above noted, three have been issued in Collins, Holden and Setchell, Phycotheca Boreali-Americana, Fasc. XVIII; *Cylindrospermum stagnale*, No. 856, *Spirulina Meneghiniana*, No. 852, *Codiolum pusillum* forma *Americanum*, No. 869. *Rhizoclonium erectum* *Dichothrix rupicola* and *Ascophyllum nodosum* forma *scorpioides* will be issued in a later fascicle.

The fact that the *Rhizoclonium* and the *Dichothrix* have been secured in quantity sufficient for distribution, and that the *Polysiphonia* has not, illustrates a principle which the algologist, perhaps more than any other kind of botanist, should always keep in mind; in case of doubt, take a large quantity. There is no danger of exterminating a species of algae, or of seriously reducing its number in any locality. If the plant has passed fruiting, it can do no harm to gather it; if not yet in fruit, new plants are certain to take the place of what is gathered; if in full fruit, a supply of spores, sufficient to furnish next year's growth a hundred times over, must have been already deposited. The writer

secured ample supplies of the *Rhizoclonium* and of the *Dichothrix* when first seen, without any idea that they were novelties; but a search for additional *Polysiphonia*, the day after the discovery, was unavailing; nearly everything else ever found on Zostera on the Maine coast was abundant, but not a trace of the desired species. The locality where yesterday hundreds of specimens could have been gathered without moving the boat, was no longer to be found.

MALDEN, MASSACHUSETTS.

THE "FALL DANDELIONS" OF NORTH AMERICA.

M. L. FERNALD.

The common fall dandelion of the eastern United States and Canada, the "arnica" of the Maine coast, *Leontodon autumnalis*, was apparently first recorded as an established plant in the United States in 1863 when, in the 4th edition of the Manual, Dr. Gray recorded it as "common in E. New England." The plant had been collected, however, by Cormack in Newfoundland in 1822 and there is also a specimen in the Gray Herbarium collected by Oakes (who died in 1848) in "shade" at Ipswich, Massachusetts. A specimen collected by Dr. Gray in 1848 is marked "spontaneous about Cambridge." From that time the plant has spread rapidly by roadsides and in fields throughout New England and eastern Canada, and it is now known westward to Ontario and Michigan, and south into Pennsylvania. A large form of the plant with very pubescent or even lanate involucres has been known to New England botanists for some years. This plant which cannot be separated specifically from the usually smoother *L. autumnalis* is the variety *pratensis* of Koch (*Apargia pratensis*, Link).

Leontodon autumnalis ordinarily has a more or less branching scape, the heads before anthesis are ascending, and the pappus consists of a single series of plumose bristles. Two other plants of another subgenus have been found occasionally on ballast about New York, Philadelphia, etc. These are *L. hirtus*, L. and *L. hispidus*, L. From *L. autumnalis* they are quickly distinguished by the simple naked scapes, the heads before anthesis nodding, and two rows of pappus. *L. hirtus* has recently been reported from an inland station in Penn-

sylvania, but it is not yet a weed of broad distribution. In the Gray Herbarium there is a sheet of *L. hispidus* collected by the late George Thurber in "meadows" at Providence in August, 1844. Yet there is no evidence that the plant has spread in that region. Mr. J. Franklin Collins informs me that he has never found the plant; nor is it represented from Providence in the older local herbaria which he has examined. The species may yet be found established in Rhode Island; but it is worthy of note that while *L. autumnalis*, introduced into New England in the 40's, has become an every-day weed, *L. hispidus*, collected at Providence in 1844, has apparently never obtained a foothold.

The four forms of the genus thus far known in America may be distinguished as follows:

* Scape branching: peduncle scaly-bracteate: heads before anthesis erect: pappus a single row of plumose bristles.

L. AUTUMNALIS, L. Spec. ii. 798. Involucre glabrous or slightly pubescent. — Fields and roadsides, Newfoundland to Ontario, Michigan and Pennsylvania, flowering from late May to October.

Var. PRATENSIS, Koch, Syn. 418. Involucre and tips of peduncles densely soft-pubescent.— MAINE, Orono, July 12, 1897 (*M. L. Fernald*): MASSACHUSETTS, Dorchester, June 2, 1895 (*W. Deane*); Canton, July 11, 1899 (*F. G. Floyd*); Siasconset, Nantucket, June 9, 1900 (*M. A. Day*, no. 80): CONNECTICUT, Southington, June 5, 1898 (*L. Andrews*).

* * Scape simple and naked: heads before anthesis nodding: pappus double.

L. HISPIDUS, L. Spec. ii. 799. Scape 1.5 to 3 dm. high: involucre conspicuously bristly-hirsute: all the achenes with plumose pappus.— RHODE ISLAND, meadows, Providence, Aug. 1844 (*Geo. Thurber*), not since seen: NEW YORK, ballast, Hunters Point, New York City, Aug., 1879 (*Addison Brown*).

L. HIRTUS, L. Spec. ed. 2, ii. 1123. Scape 1 to 2 dm. high: involucre glabrous; pappus of outer achenes mostly plumeless.— Ballast, New York City (*Addison Brown*), Philadelphia (*C. F. Parker*, *I. C. Martindale*): naturalized near Victoria, Vancouver Island (*John Ball et. al.*). Reported from Seidersville, Pennsylvania.

GRAY HERBARIUM.

Branched Broom-rape upon Tomato.— During the past season a single tomato plant in my experiment grounds was infested with the *Orbanche ramosa* L. It fastened itself upon one of the main roots of the tomato plant, and produced a base, below ground, an inch in diameter, from which a cluster of branching stems arose bearing the racemes of bluish yellow flowers in early July. While New Jersey has a record for *Orbanche minor* J. E. S. upon clover, *Conopholis Americana* (L.f.) and the old *Aphyllon uniflorum* (L.) and *Epiphegus Virginiana* (L.), this branched Broom-rape seems new to the State and, so far as it is determined, for any region north of Kentucky, where it is destructive to hemp and tobacco. The writer would like to hear whether this European parasite has previously occurred in New England or the Middle States. It is interesting that the original Linnaean name stands unchanged, a rarity in this little group of root parasites.— Byron D. Halsted, New Brunswick, New Jersey.

An unarmed Connecticut Blackberry. — Dr. C. B. Graves has brought me for examination a suite of specimens collected from a large patch of slender blackberry bushes in a damp thicket at Groton, Connecticut. The bushes, which have been carefully studied by Dr. Graves, differ from the common high blackberry of the region, *Rubus nigrobaccus*, Bailey, in their more slender usually prickleless canes, and the very elongate loose racemes. In the ordinary prickly form of *R. nigrobaccus* the inflorescences are somewhat elongate, but even in their most mature condition, at fruiting time, they are only 1 or 2 dm. long. In Dr. Graves' plant, however, the racemes are 2.5 to 3 dm. long. But the fruit of the plant is essentially like that of *R. nigrobaccus*, though drier than in the best forms of the species; and the pubescence of the two plants is essentially the same. The occurrence of occasional fine prickles on the midrib of the leaves, and their very rare occurrence on the canes further show that the Groton plant is an extreme variation of *R. nigrobaccus*, with which I take pleasure in associating the name of its discoverer. This variety may be known as

Rubus nigrobaccus, Bailey, var. **Gravesii**. Canes slender, essentially without prickles; young branches and inflorescence densely glandular-villous: leaves as in the species, but less prickly or prickleless: racemes leafy below, 2.5 to 3 dm. long; the pedicels

somewhat ascending, 2.5 to 5 cm. long: fruit globose or ovoid, about 1 cm. long. — Damp thicket, Groton, Connecticut, June 21 and Aug. 12, 1901 (*C. B. Graves*, no. 227). — M. L. Fernald, Gray Herbarium.

Some Extensions of Range.—*Ranunculus Alleghenieusis*, Britton, which is not mentioned in the recently published Flora of Vermont, was collected by the writer in Smuggler's Notch, Vermont, July 5, 1897.

Acalypha Virginica, L. var. *gracilens*, Muell., whose northern limit in Gray's Manual and Britton & Brown's Ill. Flora, is given as Rhode Island and Connecticut, was collected in Bourne on Cape Cod, September 15, 1901 (*G. G. Kennedy, M. L. Fernald, E. F. Williams*), at Readville, Mass., near Boston, September 23, 1900 (*W. P. Rich, H. A. Purdie, E. F. Williams*); and at Hampton Falls, N. H., September 22, 1901 (*B. L. Robinson, E. F. Williams*).

Cyperus Grayii, Torrey, given in Gray's Manual as occurring from Plymouth, Mass., to New Jersey, was collected by the writer at Plum Island, near Newburyport, Mass., where it grew in abundance, on August 4, 1899.

Prenanthes serpentaria, Pursh (not *P. trifoliolata*, Fernald) was found growing in several places in Westwood, Mass., on October 6th, 1901, by Mr. M. L. Fernald and others. *P. trifoliolata* is the form common in this neighborhood and northwards. It is a smooth plant with the pappus included within the scales of the involucre. Westwood appears to be one of the most northern stations for *P. serpentaria* which is common southwards, and is distinguished from *P. trifoliolata* by its somewhat bristly involucre and by the very long pappus which exceeds the involucre by 1 to 2 lines. — Emile F. Williams, Boston, Mass.

LOBELIA INFLATA × CARDINALIS.

Oakes Ames.

An isolated plant of *Lobelia inflata*, L. was impregnated when the flowers were in a receptive condition with pollen of *Lobelia cardinalis*, L. The flowers were not netted nor in any way protected from insect visits as no other plant of the species was known to be within a radius of one hundred or more yards. Some of the impregnated

flowers produced seeds. These seeds were sown in boxes of earth on February 5, 1900, and placed in a greenhouse. In a few days they germinated and compact rosettes of ovate leaves were formed. On May first the plants were set out in a rock garden and there maintained their rosette form throughout the summer. They all finally died, however, before the end of winter, only one having sent up flowering shoots. Plants which in the fall of the year were transferred to a greenhouse lingered along for a short time and then also died.

The plant which bloomed had for the most part the characteristics of *L. inflata*, L., but the flower shoots were produced laterally from the rosettes, with the exception of a terminal one which presumably on account of weakness, did not bear flowers. The structural details of the flowers and fruits were the same as in *Lobelia inflata*, L., but the color of the corollas was unusual, being of a sulphur hue at first, then changing to a greenish white. As this peculiarity in color and the persistency of the compact leaf rosettes were the only convincing evidence that some change had been brought about in the constitution of the plant, it was thought that the unusual conditions in which the seeds germinated had exerted an influence. To obtain information on this point, seeds of *L. inflata*, L. were sown in the same greenhouse where the seeds of the supposed hybrid had been planted. This sowing took place on February 5, 1901. The seeds germinated in due time and small transient rosettes of leaves were formed. When placed in the rock garden the plants sent up their flower shoots in the ordinary way and were in every respect characteristic of *Lobelia inflata*, L. A comparison of the leaf rosettes of the supposed hybrid and of the species proved of value in forming conclusions. In the hybrid the rosettes were large and vigorous, and formed from thirty to forty persistent leaves. In the species the rosettes were small and in the course of the growing season disappeared.

Lobelia cardinalis, L. on the other hand in the first year forms rosettes of leaves, though much larger ones than those of the supposed hybrid, and maintains them through, at least, one growing season.

From these observations, we may conclude, that the attempt to impregnate *Lobelia inflata*, L. with pollen of *L. cardinalis*, L. was successful. But the behavior of the seedlings was not at all what

one would expect. If hybridization was effected, then the parental characters were peculiarly distributed; if it was not, then the formation of stable leaf rosettes has still to be explained.

In order to carry the experiments farther the flowers of the supposed hybrid were inter-crossed and results are now awaited.

In addition to the experiments just noted reverse crosses were made, *Lobelia cardinalis*, L. being used as the seed parent. Unfortunately the results obtained were of an uncertain nature.

Botanic Garden of Harvard University.

ERRATA.

Page 6,	line 16;	for *paupurculus* read *pauperculus.*
" 48,	" 18;	" less *read* more.
" 50,	" 1;	" + " + +
" 54,	" 23;	" toohed *read* toothed.
" 61,	" 15;	" *Coeleboyyne* read *Coelebogyne.*
" 88,	" 13;	" *hordaceus* read *hordeaceus.*
" 103,	" 1;	" *Panicum virgatum* read Panicum virgatum.
Page 114,	line 37;	for × *read* +
" 118,	" 17;	" spagnous *read* sphagnous.
" 128,	" 42;	" 18 mm. *read* 1.8 mm.
" 165,	" 7;	" as *read* was.
" 169,	" 34;	" *flexeosa* read *flexuosa.*
" 174,	" 29;	" *stitchensis* read *sitchensis.*
" 181,	" 2;	*dele* * before *Lophozia barbata.*
" 184,	" 2;	*for* sulula *read* subula.
" 189,	" 31;	" *ophiogiossoides* read *ophioglossoides.*
" 205,	" 14;	" T. *read* F.
" 217,	" 8;	" Nabulus *read* Nabalus.
" 225,	" 11;	" dyes *read* dies.
" 248,	" 14;	" *ebenium* read *ebeneum.*
" 251,	" 26;	" clyindric *read* cylindric.
" 264,	" 26;	" *leucocarpa* read *leucocarpum.*

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